METEOROLOGICAL OFFICE
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27 OCT 1966

MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL,

1889—1890.

LONDON:
PRINTED BY EYRE AND SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1890.

METEOROLOGICAL OFFICE
28 OCT 1892

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MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL.

1889—90.

63, *Victoria Street*, *April* 3, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. STONE. | THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 20) were read and confirmed.

Read—The following Memorandum (Minutes, 1888, p. 110):—

MEMORANDUM.

Land Room, April 3rd, 1889.

MY memorandum of February 20th (see Minutes, 1888, page 107) was apparently understood as an application for the employment of extra hands to clear off the arrears of work in this room. This, however, was not quite what I meant; for while I am most anxious to bring the publication of the returns from Stations of the Second Order up to date, I am met by this difficulty—that since all the sheets have to pass through my hands for final revision, the rate of output practically depends upon my speed of work, and consequently the immediate addition of several extra workers would result in more preparatory work being done than I could deal with, with proper care, and while this work would of course be all to the good, the sheets passed for the printer would not be increased at the same rate.

The remedy for this is to be found in the devolution of some of the work I have been accustomed to do upon my more experienced assistants; but this process must of necessity be cautiously carried out, and with due regard to the detection of errors and to general accuracy.

The present position of the work of the room may be stated thus:—The sheets for the year 1885 will all be passed to the printer by the end of April. All the returns received from the Irish stations are examined and checked to date (this has always to be done for the Report of the Registrar General for Ireland), and a little work has been done upon other returns for 1889. The tabulation of the anemograms is done as far as August 1888 (except Holyhead, which is done to date).

To push on the work, while keeping up the examination of the current returns, it is certainly desirable to engage a boy (at say 8*s*. or 10*s*. per week), as mentioned in my previous memoranda, and I think I can, in addition, profitably use one temporary clerk at a salary of not more than 30*s* per week, the person engaged to distinctly understand that his employment is but for a time.

If the Council give me this help, then I estimate that by the end of the present year I shall be able to get the examination of the returns for 1889, and the tabulation of the anemograms done up to date, and, in addition, the volume of returns from Stations of the Second Order for 1886 in the printer's hands. Then by the end of the official year the volume for 1887 would be done, and before the end of 1890 the arrears all cleared off.

(Signed) JOHN A. CURTIS

R. H. Scott, Esq.

Mr. Scott was instructed to carry out the plan suggested in the report.

Read—Letters 563 and 261 from Mr. Cullum as to the performance of the electrical anemometer at Valencia.

E 58193. 25.—5/89. Wt. 221. E. & S. A

Submitted—The following report on the 8.30 p.m. forecasts for March 1889:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	36	68	52	85
"	b	42	23	33	
"	c	16	3	9	
"	d	6	6	6	
Scotland, E.	a	29	45	37	76
"	b	48	29	39	
"	c	23	13	18	
"	d	0	13	6	
England, N.E.	a	42	42	42	78
"	b	32	39	36	
"	c	16	3	9	
"	d	10	16	13	
England, E.	a	61	45	53	89
"	b	26	45	36	
"	c	7	3	5	
"	d	6	7	6	
Midland Counties	a	49	49	49	85
" "	b	29	42	36	
" "	c	16	3	9	
" "	d	6	6	6	
England, S.	a	68	61	65	87
"	b	19	26	22	
"	c	10	7	9	
"	d	3	6	4	
Scotland, W.	a	26	45	36	73
"	b	39	35	37	
"	c	29	10	19	
"	d	6	10	8	
England, N.W.	a	36	45	41	78
"	b	39	35	37	
"	c	19	10	14	
"	d	6	10	8	
England, S.W.	a	49	62	56	94
"	b	45	32	38	
"	c	6	3	5	
"	d	0	3	1	
Ireland, N.	a	32	55	44	86
"	b	52	32	42	
"	c	10	10	10	
"	d	6	3	4	
Ireland, S.	a	42	49	46	79
"	b	35	32	33	
"	c	13	6	10	
"	d	10	13	11	
Summary.					
British Isles	a	43	52	48	83
"	b	37	34	35	
"	c	15	6	11	
"	d	5	8	6	

Read—A Memorandum from Mr. Baillie, stating that since the last meeting nine logs had been received, eight of them being "excellent."

Mr. Scott was directed to present the Charts O. 32 to Captain Docherty, and O. 27 to Lieutenant Helby, R.N., and to convey the best thanks of the Council to the other observers.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands, since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful)	- -	= 18
C (failures)	- - -	= 1

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

A fresh to strong gale from the north-westward was experienced in the north and east of Scotland on the night of the 25th March. At 8 a.m. on that day a depression was lying near the Shetlands, and this travelled away, as anticipated, in an easterly direction. During the ensuing night, however, another disturbance advanced quickly from the north-westward. By 8 a.m. next day the gale was beginning to subside.

(Signed) F. J. BRODIE,
for
FREDC. GASTER.

Telegraphic Branch,
April 3rd, 1889.

Submitted—The following statements of work during March 1889:—

MARINE BRANCH.

April 2nd, 1889.

Examined 16 new logs and 4 lighthouse registers.
Preparation and extraction of Office and Admiralty observations in the Red Sea.
Discussion of sea temperatures, &c., in all months near Cape Guardafui.
Preparation and charting of currents in all oceans from Office and Admiralty logs.
Proofs of quarterly pressure and temperature charts examined, and the temperature charts sent for revise.
Copying hydrographical notices contained in logs 7455, 7456, and 7457 for the Admiralty.
Copying the observations from a rough book into log 7426.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

PANTAGRAPH ROOM.

April 1st, 1889.

Observatory Returns.—Proof of "Hourly Readings" revised and signed for press to end of July 1886. The hourly and other mean values, and the hourly values of vapour tension calculated, and the readings copied to end of September 1886. The calculation of the means for October is well advanced.

Harmonic Analyser. — The ordinary work with the instrument has been suspended, and Mr. Sheerman has been wholly employed in working from the instrumental results the temperature coefficients for five-day periods for the years 1871–82; the results for about six years have been dealt with in the month.

Quarterly Weather Report.—Very little has been done to this; the anticyclonic tables have been prepared and the monthly weather and wind charts drawn.

Miscellaneous.—The comparison of the electrical anemograms has been kept up to date, and memoranda prepared on the result. Also a memorandum on the tabulation of squalls from the ordinary "Robinson" anemograms. Some time occupied on work connected with cloud measurements.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

April 1st, 1889.

Examinations.

August and *September* 1887 and *February* 1889.—Completed.
Weekly examination (on receipt) of curves and documents from all stations.

Reports.

August and *September* 1887 and *February* 1889.—"*Notes of Errors*" to all observatories and monthly reports thereon.

(Signed) T. E. ALLEN.

The increments to the "classified" clerks, referred to on Minutes, 1884–5, pp. 118–19, and to the female clerks (Minutes, 1888–9, p. 16), were allowed; the salaries which are changed for the current year are the following:—

CLASS I.—Maximum £275.

	Salary in 1889-90. £	s.	d.
J. A. Curtis	230	0	0
J. E. Cullum (Minutes, 1886–7, p. 98)	235	0	0

CLASS II.—Maximum £200.

G. G. Francis	200	0	0
T. D. Bell	200	0	0
A. J. Rigby	195	0	0
H. Harries	190	0	0
W. Allingham	190	0	0

CLASS III.—Maximum £150.

S. Call	150	0	0
W. G. James	145	0	0
R. Sargeant	140	0	0
J. Sheerman	140	0	0

Class IV.—Maximum £110.

A. H. Bell	100	0	0
R. J. Canham	100	0	0
C. W. Heinemann (Minutes, 1886–7, p. 98)	70	0	0
L. H. Powers (Minutes, 1887–8, p. 120)	60	0	0

FEMALE CLERKS.

	Weekly. £	s.	d.
Miss Anderson (Maximum 2*l.*)	1	17	6
„ Harris } („ 30*s.*)	1	6	6
„ Baird } („ 30*s.*)	1	4	0

The following increments were allowed to the "unclassified" clerks:—

	s.	d.	£	s.	d.
C. Pycock	+ 1	6	0	19	0
F. E. Dash	+ 1	6	0	12	6

Submitted—The following list of publications which had been received since the last meeting:—

Pressione atmosferica ridotta al medio livello del mare in Modena. (Mem. R. Accad. Sc. Modena.)

Coefficienti per la temperatura e per la pressione atmosferica nel barometro registratore Richard. (Mem. R. Accad. Sc. Modena.)

Influenza della distanza del Sole dal piano dell' equatore celeste sui periodi barometrici diurni. (Boll. Osserv. Moncalieri, serie ii., vol. ix.)

Determinazione dei coefficienti per la temperatura e per la pressione atmosferica nel barometro registratore Richard. (Boll. Osserv. Moncalieri, serie ii., vol. ix.) Del Prof. D. Ragona.

Observatoire météorologique de Saint-Martin-de-Hinx (France). xxiv^e. année, 1887–88. Par H. Carlier.

Report on the proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land, by A. W. Greely. Vol. ii.

Temperaturmittel für Suddeutschland. Von K. Singer. (Beob. meteor. Stationen Bayern, Bd. x., 1888.)

April 3rd, 1889.

Reported—That the following cheques had been drawn during the month of **March** :—

1889.			£	s.	d.
Mar.	2nd.	J. S. Harding, jun., for payment of weekly salaries -	16	0	6
„	6th.	E. J. Hood, copying Sanchez observations - -	2	0	3
„	„	J. T. Williams „ - -	2	0	3
„	„	Postmaster-General, telegrams - - - -	119	7	5
„	9th.	J. S. Harding, jun., for payment of weekly salaries -	16	0	6
„	14th.	Paris M.O., telegrams - - - - -	*3	18	3
„	16th.	J. S. Harding, jun., for payment of weekly salaries -	16	0	6
„	21st.	Pall Mall Coal Company, coals - - - -	8	16	0
„	„	J. A. Curtis, for payment of accounts for discussion of old series of observations - - - -	9	15	6
„	23rd.	J. S. Harding, jun., for payment of weekly salaries -	16	0	6
„	„	Postmaster-General, rent of private wire (Mullaghmore)	31	5	0
„	„	General Assurance Company, fire insurance - -	2	8	0
„	30th.	J. S. Harding, jun., for payment of weekly salaries -	16	0	6

			£	s.	d.			
„	„	General R. Strachey, R.E., salary -	291	17	9			
„	„	A. Buchan, fees - - - -	149	4	1			
„	„	Prof. G. H. Darwin, fees - - -	131	7	5			
„	„	F. Galton, fees - - - -	149	4	1			
„	„	E. J. Stone, fees - - - -	155	3	0			
„	„	Capt. W. J. L. Wharton, R.N., fees -	94	10	2			
„	„	E. Davis, Council income tax - -	25	0	0			
„	„	J. S. Harding, jun., Council petty expenses	3	13	6			
						1,000	0	0
„	„	R. H. Scott, Secretary - - - - -				66	13	4
„	„	J. S. Harding, jun. - } Office salaries - - -				27	15	6
„	„	T. D. Bell - - }				16	5	0
„	„	Capt. H. Toynbee, pension - - - -				12	0	0
„	„	J. Sheerman, salary (harmonic analysis) - -				11	5	0
„	„	J. E. Cullum, salary (Valencia Observatory) - -				19	3	4
„	„	R. H. Curtis -				22	18	4
„	„	J. A. Curtis - -				18	15	0
„	„	T. E. Allen - -				16	13	4
„	„	C. H. Thompson - } Salaries (discussion, &c. of				12	10	0
„	„	S. Call - - } observations).				12	1	8
„	„	R. G. Canham -				7	18	4
„	„	A. H. Bell - -				7	18	4
„	„	L. H. Powers - }				4	11	8
„	„	F. Gaster - -				25	15	7
„	„	F. J. Brodie -				18	15	0
„	„	G. G. Francis -				18	5	7
„	„	A. J. Rigby - } Salaries (preparation, &c. of				17	16	3
„	„	R. Sargeant - } Weather Reports).				12	13	1
„	„	A. R. Simpkins -				10	6	3
„	„	F. W. Snell - -				6	13	4
„	„	C. W. Heinemann - }				5	8	4
„	„	Nav.-Lt. C. W. Baillie, R.N. - -				29	3	4
„	„	R. Strachan - -				27	15	6
„	„	C. Harding - - Salaries (discussion, &c. of				22	18	4
„	„	H. Harries - - } observations and care of				15	8	4
„	„	W. Allingham - instruments).				15	8	4
„	„	W. G. James -				11	13	4
„	„	F. T. Bullen - -				9	3	4
„	„	R. F. Wallace - }				9	3	4
„	„	G. J. Mayhew, rent - - - -				158	15	0
„	„	J. S. Harding, senr., pension - - - -				10	14	1
		Carried forward - -				£1,941	18	4

* Paid by draft on a foreign banker.

		£	s.	d.	£	s.	d.
1889.	Brought forward -	-		-	1,941	18	4
Mar. 30th.	H. Williams, care of bridled anemometer - - -	2	10	7			
,, ,,	,, care of Robinson's anemometer - - -	2	11	3			
					5	1	10
,, ,,	C. Niven, Aberdeen Observatory -	69	7	0			
,, ,,	J. L. E. Dreyer, Armagh ,, - -	12	10	0			
,, ,,	W. L. Fox, Falmouth ,, - -	62	19	0			
,, ,,	Fleetwood Improvement Commissioners, care of anemometer - - -	2	10	9			
,, ,,	R. Grant, Glasgow Observatory - -	18	9	3			
,, ,,	Kew Committee, allowance for quarter -	100	0	0			
,, ,,	W. Harrison, care of N. Shields anemometer	2	10	8			
,, ,,	W. I. Fortescue, care of Orkney anemometer	2	10	0			
,, ,,	S. J. Perry, Stonyhurst Observatory -	13	8	6			
,, ,,	J. E. Cullum, Valencia ,, -	19	6	3			
,, ,,	Scottish Meteorological Society, copy of Ben Nevis observations - -	100	0	0			
					403	11	5
,, ,,	G. T. Watson, care of Yarmouth anemometer - - -	3	19	6			
,, ,,	,, meteorological reports -	4	12	6			
					8	12	0
,, ,,	W. Boswell, Aberdeen Observatory -	4	18	9			
,, ,,	H. Todd, Cambridge - - -	4	11	0			
,, ,,	H. Mohn, Christiania - - -	5	10	0			
,, ,,	P. Curnow, Dungeness - - -	4	11	5			
,, ,,	W. Brand, Dunrossness - - -	3	18	4			
,, ,,	W. H. Bunce, Hawes Junction - -	1	19	3			
,, ,,	S. Richards, Holyhead - - -	3	18	4			
,, ,,	G. G. Appleton, Hurst Castle - -	3	18	10			
,, ,,	J. Fisher, Jersey - - -	4	1	0			
,, ,,	F. Gaster, London - - -	3	18	0			
,, ,,	W. Berridge, Loughborough - -	3	5	4			
,, ,,	Secretary of Lloyd's, for Malin Head -	4	17	6			
,, ,,	K. Kerr, Mullaghmore - - -	5	4	6			
,, ,,	A. Penny, Nairn - - -	4	4	6			
,, ,,	W. Wickham, Oxford - - -	3	12	6			
,, ,,	O. Boeddicker, Parsonstown - -	3	5	0			
,, ,,	W. Hewitt, Prawle Point - -	3	5	0			
,, ,,	S. Blake, St. Ann's Head - -	3	6	6			
,, ,,	W. Thomas, Scilly - - -	8	6	10			
,, ,,	J. H. Watson, Spurn Head - -	3	5	5			
,, ,,	J. Forbes, Stornoway - - -	5	12	5			
,, ,,	J. Sinclair, Wick - - -	3	5	0			
,, ,,	F. Guy, York - - - -	3	18	0			
					96	13	5
,, ,,	A. Buchan, salary - - -	-		-	37	10	0
,, ,,	J. R. Jones, Aberdeen agent - -	1	11	1			
,, ,,	J. Fowler, Cardiff agent - - -	5	4	3			
,, ,,	L. Allen, Dundee ,, - - -	6	8	6			
,, ,,	Z. Scaping, Hull ,, - - -	3	12	6			
,, ,,	J. Gill, Liverpool ,, - - -	13	3	9			
,, ,,	D. Forbes, Southampton agent - -	14	3	2			
					44	3	3
	Carried forward - -				£2,537	10	3

			£	s.	d.	£	s.	d.
1889.		Brought forward -	-		-	2,537	10	3
Mar. 30th.		R. W. Munro, repairing bridled anemometer - -	1	12	2			
„	„	„ Scilly anemometer -	35	12	0			
„	„	„ carriage of anemometer -	1	7	4			
„	„	„ repairing Heligoland anemometer - -	4	18	6			
						43	10	0
„	„	R. H. Curtis, glass scales - -	-		-	5	12	6
„	„	P. Adie, repairing barometers - -	-		-	30	1	6
„	„	Kew Committee, verifications - -	-		-	33	16	0
„	„	F. Gaster, for payment of allowance for extra attendance - - - - - -	-		-	18	10	4
„	„	J. Pitkin, watch aneroids - -	-		-	24	0	0
„	„	J. H. Woodstock, packing cases -	-		-	2	7	6
„	„	J. S. Harding, jun., petty cash - -	-		-	35	0	0
						£2,730	8	1

Submitted—The following report of work :—

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.
(To 31st March 1889.)

Monthly Weather Report :—

1887, not recommenced yet.
1888, *January* completed, and passed through press (now awaiting completion of February so as to print off in whole sheets).
February, nearly ready for printer.
1889, *January* completed, and copies expected daily.
February, in printers hands.

A good deal of delay has occurred with the lithographers in altering the size and arrangement of the plates.

Weekly Weather Report :—

1889, all numbers issued promptly to date. Preparation of Appendices well in hand.

Daily Weather Report :—

1889, all numbers issued promptly, with "Corrections and Additions" Sheets for February.

Hay Harvest Forecasts.—Results of checking, summarized, handed in, and printed.

Primary Checking of Storm Warnings issued.—Done to date.

Investigation into Prevalence of Fog over the United Kingdom—Proceeding steadily.

System of issuing Storm Warnings to the Coasts of the British Islands.—Has been under consideration throughout the month, and has been reorganised.

Preparation of tables (Observations at Telegraphic Reporting Stations) for January, February, and March, 1880, for Quarterly Weather Report, completed. Tables handed in.

Since March 1st, Mr. Snell has been engaged as telegraphist in this branch, and is making satisfactory progress.

(Signed) FREDC. GASTER.

63, *Victoria Street, April* 17, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. STONE.
PROFESSOR DARWIN.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (April 3) were read and confirmed.

The draft of the Report of the Council for the year ending March 31st, 1889, was submitted.

Read—Letter 711 accompanying a report by Mr. H. N. Dickson on his inspection of the remaining fishery barometers on the coast of Scotland (Minutes, 1888, p. 61). The following is an abstract of the report :—

ABSTRACT of Mr. H. N. DICKSON'S REPORT of INSPECTION of FISHERY BAROMETER STATIONS on the EAST COAST of SCOTLAND.

Station.	Situation.	Condition.	Remarks.
WICK	On gable of house at harbour head	Good, excepting one vernier rather slack.	Not read. Valued. Frame for diagrams wanted.
KEISS	On gable of cottage above harbour	Good	Not read. Valued.
STAXIGOE	In case on a post above harbour head.	Good, except for air in tube	No diagrams kept. Valued.
STROMA	In case on a post in front of post office.	Good	Do. Do.
SARCLET	In joiner's workshop	Very bad	No fishing or trade at this port.
LYBSTER	Wall of harbour office	Good	Key of vernier wanted. Barometer not much valued.
DUNBEATH	Wall of public store close to harbour.	Good, excepting one vernier rather slack.	No attention paid to instrument.
PORTMAHOMACK	Inside window of harbour office	Good	Not read. Valued.
CROMARTY	On gable of a house close to shore	Good	Case had not been opened for years.
AVOCH	In wall of store near harbour	Index loose, otherwise good	Fishermen value barometer. They would like to have storm warnings.
NAIRN	In wall of harbour office	Fairly good	No readings taken. Valued.
BURGHEAD	Do.	Air in tube, otherwise good	Diagrams kept.
PORTESSIE	In gable of house near harbour	Rack of vernier useless	No readings taken. Valued.
PORTKNOCKIE	Inside window of stone shed close to harbour.	Good	Set irregularly. Valued.
PORTSOY	In gable of house close to harbour	Good	Diagram kept. Fishermen do not pay much attention to glass.
WHITEHILLS	In house erected for the purpose	Air in tube, otherwise good	Barometer only used by fishermen for comparison of aneroids.
GARDENSTOWN	In wall of store above harbour	Fairly good. Rackwork useless.	Position bad. Little attention paid to barometer.
ROSEHEARTY	In special house at harbour head	Good	Valued.
PITULLIE	Wall of Mr. Taylor's house	Fairly good	Not much attention paid by fishermen.
INVERALLOCHY	On gable-end of cottage	Do.	Valued.
POINTLAW	At side of wooden house at landing stage of ferry.	Do. tube loose	Do.
FINDON	Inside round turret in middle of village.	Do.	Do.
PORTLETHEN	In outhouse of J. Wood's cottage	Bad	No readings. Valued.
SKATERAW	At end of house above harbour	Good	Do.
MUCHALLS	In coast guard watch room	Good	Instrument not wanted, as fishing is entirely discontinued.
STONEHAVEN	At end of house facing harbour	Good	Mr. Duncan, berthing master, wants D.W. Reports.
ARBROATH	On side of pilot watch house	Fairly good	No records or diagrams.

The Daily Weather Reports supplied to the Nairn Town Council are much neglected, and are of no special use in their present position. The fishermen ask that the Reports may be placed in the Reading Room of the Fisherman's Institute.
Repairs required at several stations. Barometers at Sarclet and Muchalls may be withdrawn.

Read—Letters 667 and 717 from Mr. Cullum as to the performance of the electrical anemometer at Valencia. Mr. Scott was instructed to inquire what would be the

amount due to the Anglo-American Telegraph Co. for the wear and tear of batteries, &c. (P.C. 787).

Read—Letter 716 from Mr. Cullum inquiring if he might put up a small hut for making observations of magnetic declination (Minutes, 1887, p. 1), and also procure a carpet for 2*l.* 10*s.* for the computing room.

Permission granted in both cases (P.C. 788).

Read—Letter 665 from Mr. W. H. Dines, accompanying a report on his experiments with the bridled anemometer (Minutes, 1888, p. 13).

The report was referred to Professor Darwin.

Read—A memorandum from Mr. Baillie stating that since last meeting six logs had been received, four of them being "excellent."

Mr. Scott was instructed to convey the thanks of the Council to the observers.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of Council:—

(1.) WARNINGS ISSUED.

A + B (successful) - - - -	= 10
C (failures) - - - - -	= 8

(2.) GALES EXPERIENCED BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
17th April 1889.

The Hydrographer inquired as to the present condition of the Charts of Cyclone Frequency in the South Indian Ocean (Minutes, 1887, p. 87). As it appeared on investigation that the data for three years only were still required to complete the charts, Mr. Scott was instructed to request Mr. Meldrum to forward the returns, and to say that the charts would be printed in October (P.C. 863).

Submitted—The following memorandum:—

The following instruments will be required for stock:—

"A" ACCOUNT.

	£	s.	d.
500 thermometers, cost - - - -	175	0	0
50 maximum thermometers - - - }	65	0	0
50 minimum thermometers - - - }			
25 aneroids - - - - -	62	0	0

B. T. ACCOUNT.

200 thermometers, cost - - - -	77	0	0
100 hydrometers „ - - - -	25	0	0
50 screens „ - - - -	25	10	0
25 rain-gauge glasses - - - -	5	0	0

(Signed) R. STRACHAN.

15th April 1889.

Mr. Scott was instructed to order these instruments.

Submitted—The following list of publications which had been received since the last meeting:—

De l'influence des forêts sur le climat de la Suède III. Humidité de l'air. Par Dr. H. E. Hamberg.

Annual report of the Director of the Royal Alfred Observatory, Mauritius, for the year 1887.

Egeson's weather system of sun-spot causality, being original researches in solar and terrestrial meteorology. By C. Egeson, Sydney Observatory.

Commission météorologique du département de Vaucluse. Compte-rendu pour l'Année 1888.

Jahrbuch der meteorologischen Beobachtungen der Wetterwarte der Magdeburgischen Zeitung. Jahrg. VII. 1888.

Deutsche Ueberseeische meteorologische Beobachtungen. Heft II. Labrador, 1885. Walfischbay, 1887.

Normaler Gang und Störungen der erdmagnetischen Declination. Von H. Wild.

Ueber Assmann's neue Methode zur Ermittlung der wahren Lufttemperatur. Von H. Wild.

Untersuchungen über die tägliche Oscillation des Barometers. Von J. Hann.

Resúmen de las observaciones meteorológicas hechas en la estación de Vilafranca del Panades durante el segundo semestre del año 1888, por D. J. Baltá R. de Cela.

April 17, 1889.

Reported—The temporary engagement of S. Woodfield at 30*s.* a week, and of A. H. Brown at 8*s.* per week (Minutes, p. 1).—Approved.

Submitted—The following statement of accounts for the year ending 31st March 1889 :—

Income.	£ s. d.	£ s. d.	Expenditure.	£ s. d.	£ s. d.
Balance from year 1887–88	- -	2,649 7 1	Administration :		
Vote for year - -	- -	15,300 0 0	Payment of Council -	1,000 0 0	
Repayment of expenses charged under—			Secretary - -	800 0 0	
(1.) Incidental expenses	10 15 6		Salaries and wages -	798 8 0	
(2.) Special researches -	*20 16 8		Rent, fuel, and lighting -	709 17 11	
		31 12 2	Furniture and fittings -	123 3 5	
Supply of Weather Information :			Incidental and contingent expenses -	339 18 6	
D.W. Charts and Forecasts - -	†253 9 0		Pensions - -	138 16 4	
6 p.m. Charts -	25 0 0		Expenses incidental to International Meteorological Congress	22 2 3	
Information for Press Agencies, &c. -	97 16 6				3,932 6 5
Telegrams - -	273 10 5		Special Researches -	- - -	591 1 8
		649 15 11	Land Meteorology :		
Sale of Instruments, &c. :			Observatories and stations - -	2,024 11 1	
Royal Navy account -	17 17 6		Discussion and reduction of observations -	1,328 16 0	
Mercantile Marine account - -	16 2 10				3,353 7 1
		34 0 4	Weather Information and Forecasts :		
Commission charged on work done for Colonies, &c. - -	- -	16 2 5	Telegraphic reports and storm warnings -	2,813 8 0	
			Preparation and issue of reports and forecasts - -	1,681 18 3	
					4,495 6 3
			Inspections :		
			Salaries and travelling -	- - -	702 5 1
			Ocean Meteorology :		
			Discussion and reduction of observations -	1,677 4 8	
			Expenses incidental to the supply of instruments :		
			Proportion for care and issue of instruments -	200 0 0	
			Royal Navy -	533 12 11	
			Mercantile Marine -	386 2 11	
			Distant stations -	32 3 1	
					2,829 3 7
			Balance - - -	- - -	2,777 7 10
		£18,680 17 11			£18,680 17 11

Liabilities.	£ s. d.	Assets.	£ s. d.
To outstanding accounts or work uncompleted - - -	427 9 3	By cash at Bank - - - -	3,365 16 6
„ Post Office (partly estimated) -	334 7 2	„ „ at Office - - - -	72 16 3
„ sundry creditors - - -	201 18 4	„ sundry debtors - - -	302 9 10
„ balance - - - -	2,777 7 10		
	£3,741 2 7		£3,741 2 7

* Including 20*l.* for Captain Noble's experiments, written back.

† A small amount deducted for bad debts.

63, *Victoria Street, May* 1, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (April 17) were read and confirmed.

Read—The following letter (Minutes, 1888, p. 125) :—

(M.O. 789.)

SIR, April 27, 1889.

I HAVE the honour to forward herewith a statement giving particulars of the cost of certain publications of the Meteorological Office, as requested in your letter of the 15th ultimo.

I am, &c.
(Signed) H. G. REID,
For Controller.

The Secretary, Meteorological Office.

STATEMENT showing the COST of PUBLICATIONS at the METEOROLOGICAL OFFICE.

No. of Publication and Short Title.	Cost of Letterpress Printing (including Paper).	Cost of Litho Printing (including Paper).	Cost of Engraving Blocks.	Cost of Binding.	Cost of Transfer Paper.	Total Cost of Work.
1.	2.	3.	4.	5.	6.	7.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
O. No. 68.—Monthly Weather Reports, 1886	151 11 10	26 3 2	—	—	—	177 15 0
O. No. 71.—Synchronous Weather Charts, N. Atlantic	36 19 7	602 2 11	1 10 0	—	—	*640 12 6
O. No. 73.—Meteorological Observations, Second Order, 1883	287 5 2	1 0 5	—	—	—	288 5 7
O. No. 74.—Hourly Readings, 1885	445 1 4	—	1 0 0	—	—	446 1 4
O. No. 76.—Charts showing Mean Barometric Pressure over Atlantic, &c. Oceans	3 6 3½	209 8 9	—	76 16 0	—	289 11 0½
O. No. 77.—Monthly Weather Reports, 1887, January—April	38 12 5½	8 14 9	—	—	—	47 7 2½
O. No. 78.—Meteorological Observations, Second Order, 1884	308 3 6¾	1 1 1½	—	—	—	309 4 8¼
Daily Weather Reports, 1888	—	566 13 8¼	—	—	44 18 0	611 11 8¼
Weekly Weather Reports, 1888	307 6 11½	—	273 0 0	—	—	580 6 11½

* Official No. 71. Part IV. has 34 plans.

The estimated cost of producing the Weekly Weather Reports for 1889 is, roughly 1,000*l.*

The approximate annual cost of Forms is: (1), for letterpress printing (including paper), 65*l.* 14*s.* 9*d.*; (2), for litho-printing (including paper), 27*l.* 13*s.* 1*d.*; total for year (1888), 93*l.* 7*s.* 10*d.*

Read—Letters 747 and 792 from Mr. Cullum, stating that the Anglo-American Company would make no charge for the use of the batteries (Minutes, p. 8), and that the batteries were now exhausted.

Mr. Scott was instructed to return the best thanks of the Council to Mr. Graves for the use of the batteries, and to make arrangements to have the anemometer returned to Kew for further experiments (P.C. 865 and 866).

Read—A memorandum from Mr. Baillie stating that since last meeting ten logs had been received, nine of them being "excellent."

Mr. Scott was instructed to express the thanks of the Council to the observers.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful)	- - - -	=30
C (failures)	- - - -	=12

2. GALES EXPERIENCED FOR WHICH NO WARNING WAS ISSUED.—None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
May 1, 1889.

Submitted—The following statements of work during April 1889 :—

MARINE BRANCH.

May 1, 1889.

Examined 18 new logs.

Preparation and extraction of Red Sea data from Office and Admiralty logs.

Charting observations of sea temperature, &c. in the neighbourhood of Cape Guardafui, and extracting remarks bearing upon the phenomena when approaching land.

Preparing and plotting currents in all oceans.

Passed for press the quarterly pressure and sea temperature charts for insertion in the new issue of "Instructions for Keeping a Meteorological Log."

Completing the copying of observations from a rough book into log 7426.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH (to 30th April 1889).

Monthly Weather Report.—Not recommenced yet.

Monthly Summary of Weather :—

1888. *January*, complete and passed through press.
„ *February*, in print and revised.
„ *March*, nearly ready for printer.
1889. *January*, printed and published.
„ *February*, in proof. Much delayed owing to loss of plate by Stationery Office.
„ *March*, in printer's hands.

Delay in producing these numbers has been due (1) to the time which has been taken by the lithographer in preparing the plates ; (2) to illness to myself and Mr. Brodie ; (3) to the Easter holidays.

Weekly Weather Report.—All numbers issued promptly to date. *Appendix I.*, first part, in proof and revised.

Daily Weather Report.—Issued promptly to date. Corrections and additions for *March* issued.

Primary Checking of Storm Warnings.—Done to date, and reports handed in.

Investigation as to Prevalence of Fog over the United Kingdom.—Proceeding slowly (see next entry).

Checking of Storm Warnings issued in 1888.—Done to end of June.

Quarterly Weather Report Tables, 1880.—Those for first quarter completed and handed into Mr. Curtis.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

May 1, 1889.

Observatory Returns.—Proof of Hourly Readings revised to end of September 1886, and Part III. signed for press. The various means and the hourly vapour tension values are calculated to the end of November 1886 ; the copying of the values for that month is now in hand.

Harmonic Analyser.—The calculation of the temperature coefficients for five-day periods for the years 1871–82 has been completed in the *a*, *b*, &c. form ; the application of the non-periodicity corrections is now in progress.

Quarterly Weather Report.—Gale tables for Part I., 1880, prepared. Chart plates for Part II. commenced.

Miscellaneous.—The working of the electrical anemometer has been under examination as before, and memoranda on the subject submitted to Council. Annual rainfall tables prepared for Mr. Symons. Harmonic curves drawn for General Strachey.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

May 1, 1889.

Examinations.

October and November 1887.—Completed.

December 1887.—*Thermograms* and *Anemograms.*

January to March 1889.—Partial examination of the Valencia work for the Registrar General of Ireland.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

October to November 1887.—"Notes of Errors" to all observatories, and monthly report thereon.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting :—

Die Niederschlags-Verhältnisse von Deutschland, insbesondere von Norddeutschland, in den Jahren 1876–1885. Von Hugo Meyer.

Deutsches meteorologisches Jahrbuch für 1887. Beobachtungs-System der Deutschen Seewarte. Jahrg. x.

New Zealand meteorological report, 1885. By J. Hector.

Observations made at the Blue Hill meteorological observatory, Massachusetts, U.S.A., in the year 1887. By A. L. Rotch.

Report of the British Association, 1888.

Boletin de la Oficina Química. Municipal de Tacuman. Tomo I. 1888, May to November.

Ueber einen registrirenden Regenmesser. Von Dr. P. Schreiber.

May 1, 1889.

63, *Victoria Street, May* 15, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 1) were read and confirmed.

With reference to the letter from the Treasury (Minutes, 1888, p. 125), Mr. Scott was instructed to write to the Treasury to say that the subject of the cost of printing was under consideration by the Council, and would be carefully examined with a view to giving effect to their Lordships' wishes, and that a further communication would be made to the Treasury as soon as possible. (P.C. 971.)

Read—The following letter:—

(M.O. 865.)

Scottish Meteorological Society, 122, George Street, Edinburgh,
May 11, 1889.

MY DEAR SIR,

As I understand that the preparation, in the usual tabular forms, of the Observations at Stations of the Second Order for another year, 1886, if I mistake not, is about to be commenced by the Office, I have to suggest that the Council take into consideration the following changes and additions as respects these forms:—

PART I.—DETAILED OBSERVATIONS. (FORM A.)

1. That in future all barometric observations printed for these stations be only corrected for instrumental errors, but not reduced to M.S.L.
2. That, in reducing to M.S.L., when that may be considered to be desirable, the temperature of the air taken be not the temperature at the station, as has been hitherto adopted in the Office, but that temperature, *plus* a correction proportional to the height, as may be agreed on.
3. That the height of the station above mean sea level, printed under the name of each station, be not the height of the *solum* where the station is planted, but that simply of the cistern of the barometer.
4. That two columns be added to the Table of Daily Observations, showing the corrected readings of the wet bulb. As an alternative the difference of the dry and wet bulbs may be given.

PART II.—MONTHLY SUMMARIES. (FORM B.)

1. As regards the barometer, that the mean pressure for each hour of observation be given instead of one general mean pressure, these not being reduced to M.S.L.
2. That the means of the wet bulb readings be given as well as those of the dry bulb.

It would further facilitate references to the tables if in Part I. the observations were "leaded" at the 5th, 10th, 15th, 20th, and 25th days of the month; and if in Part II. the months were grouped into quarters of the year by "leads."

Details as to the carrying out of these suggestions can be given at the meeting on Wednesday.

Yours, &c.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

(Signed) ALEXANDER BUCHAN.

It was resolved as regards the returns from Stations of the Second Order:—

1. That the barometer readings be not reduced to sea level, but only reduced to 32° F.
2. That the height of the barometer cistern above the ground be always inserted, as well as the elevation of the station above mean sea level.
3. That the mean readings of the barometer in Form B. remain as at present.
4. That the depression of the wet bulb for 9 a.m. and 9 p.m. and the means be given in Forms A. and B.

The subject of the repairs, &c. required at the fishery barometer stations in Scotland (Minutes, p. 8) was taken into consideration. It was resolved that the Scottish Meteorological Society be requested to see to the necessary repairs, &c. (P.C. 995.)

Mr. Scott reported that the number of fishery barometers not yet inspected was about 90, and that taking the coast from Berwick to Bristol there were 49; while on the coasts of Wales, the Irish Sea, and Ireland there were 43, of which, however, some had been visited.

He stated that Mr. Abercomby and Captain Toynbee were both ready to undertake some of these inspections.

Mr. Scott was instructed to arrange for the inspections on the terms already fixed (Minutes, 1888, p. 73). The total amount to be expended this season not to exceed about 50*l.* for each gentleman.

Read—A memorandum from Mr. Baillie stating that since the last meeting six logs had been received all of them being "excellent."

Mr. Scott was instructed to express the best thanks of the Council to the observers.

Mr. Scott reported (Minutes, p. 9) that Mr. Darwin had handed in a memorandum on the results of Mr. Dines' experiments with the bridled anemometer, and that a letter (No. 846) had been received from Professor Stokes on the subject. A further report (Lr. 871) had been received from Mr. Dines.

Mr. Darwin was requested to examine into these papers.

Submitted—The following letter:—

(M.O. 825.)

Signal Office, War Department, Washington City,
April 26, 1889.

DEAR SIR,

I SHALL be very much gratified if you will kindly furnish me with certain information concerning the methods, form, and extent of weather forecasts made by the weather service under your direction. Information upon the following points is especially desired:—

First. At what hour of the day are the observations made on which weather forecasts are based.

Second. At what hour of the day are the predictions themselves issued.

Third. Are these forecasts distributed generally by telegraph, or by what means and to what extent do they reach the general public.

Fourth. Are the weather forecasts generally displayed throughout your country, or is their use limited largely to the central station.

Fifth. How long a period in advance is covered by these forecasts, and does such period count from the hour of observation or from the hour of making the forecast.

Sixth. Are daily weather maps or bulletins issued for current use, and, if so, how long after the hour of observation is it before they reach the general public.

I should be very much gratified also if you would give the benefit of your advice, based on your experience in forecasts, as to whether you believe that forecasts general in their nature best meet meteorological needs, or whether they should be sharply defined as to time, locality, and phenomena.

I should be also pleased to know whether you find it to be true or not that the greater part of the rain which falls comes rather in patches and as local showers than as general rains which cover the entire country.

Appreciating the courtesy you extend to me by giving me information on these points, and asking the great favour of an early reply,

I am, &c.
(Signed) A. W. GREELY,
Brigadier General and
Chief Signal Officer.

Mr. R. H. Scott,
Secretary of the Meteorological Committee,
116, Victoria Street, London, S.W., England.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful) - - - -	= 3
C (failures) - - - -	= 2

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

None.

FREDC. GASTER.

Telegraphic Branch,
15th May 1889.

Submitted—The following report on the 8.30 p.m. forecasts for April 1889 :—

The letters used have the following signification :—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success. a + b.
Scotland, N.	a	47	40	44	79
,,	b	33	37	35	
,,	c	17	20	18	
,,	d	3	3	3	
Scotland, E.	a	43	47	45	85
,,	b	47	33	40	
,,	c	7	7	7	
,,	d	3	13	8	
England, N.E.	a	40	50	45	81
,,	b	47	24	36	
,,	c	13	13	13	
,,	d	0	13	6	
England, E.	a	37	53	45	78
,,	b	43	23	33	
,,	c	7	7	7	
,,	d	13	17	15	
Midland Counties	a	47	60	54	79
,,	b	33	17	25	
,,	c	13	13	13	
,,	d	7	10	8	
England, S.	a	53	60	57	82
,,	b	30	20	25	
,,	c	7	13	10	
,,	d	10	7	8	
Scotland, W.	a	44	47	46	76
,,	b	33	27	30	
,,	c	20	16	18	
,,	d	3	10	6	
England, N.W.	a	40	43	42	84
,,	b	47	37	42	
,,	c	10	10	10	
,,	d	3	10	6	
England, S.W.	a	57	57	57	86
,,	b	27	30	29	
,,	c	16	3	9	
,,	d	0	10	5	
Ireland, N.	a	47	50	49	80
,,	b	33	30	31	
,,	c	13	10	12	
,,	d	7	10	8	
Ireland, S.	a	47	47	47	76
,,	b	27	30	29	
,,	c	23	10	16	
,,	d	3	13	8	
Summary.					
British Isles	a	46	50	48	80
,,	b	36	28	32	
,,	c	13	11	12	
,,	d	5	11	8	

Submitted—The following Statement respecting the Records from July to December, 1887, received from the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 1876 and 3rd January 1883) :—

JULY—DECEMBER 1887.	ABERDEEN.		ARMAGH.		FALMOUTH.		KEW.		VALENCIA.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument - - - -	Good.	Good.	Good.	Fair.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient :—										
Due to stoppage of clock - - -	0	0	79 hrs.	79 hrs.	0	0	0	0	0	1 hr.
„ other causes - - -	4 hrs.	5 hrs.	0	21 hrs.	6 hrs.	22 hrs.	0	9 hrs.	2 hrs.	4 hrs.
Number of errors discovered :—										
By general examination - - -	2	2	0	18	40	21	7	4	37	14
Results of 40 re-measurements :—										
Greatest difference - -	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0
Mean difference irrespective of sign -	0·1	0·4	0·1	0·4	0·1	0·4	0·1	0·4	0·1	0·4
Residual difference (— Meteorological Office)	0·0	+0·1	0·0	+0·1	0·0	+0·1	0·0	+0·1	0·0	+0·1
Orientation verified - - - -	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—
RAIN GAUGE :—										
Action of Instrument - - -	Good.		Good.		Indifferent.		Good.		Good.	
Records deficient :—										
Due to stoppage of clock - - -	0		0		0		0		0	
„ other causes - - -	0		0		0		0		0	
Number of errors discovered :—										
By general examination - - -	8		7		11		1		37	

	ABERDEEN.	FALMOUTH.	KEW.	VALENCIA.
BAROGRAPH :—				
Action of Instrument - - -	Good.	Good.	Good.	Good.
Character of Photography - - -	Do.	Do.	Do.	Fair.
Records deficient :—				
Due to stoppage of clock - - -	0	0	1 hr.	0
„ failure of light - -	3 hrs.	1 hr.	0	8 hrs.
„ other causes - - -	3 hrs.	13 hrs.	3 hrs.	8 hrs.
Number of errors discovered - -				
In entry of standards - - -	0	12	2	3
„ calculating residuals - - -	0	8	1	6
„ applying „ - - -	7	7	0	35
By general examination - - -	4	47	6	85
Results of 40 re-measurements :—				
Greatest difference - - - -	·007	·007	·010	·011
Mean difference irrespective of sign -	·002	·002	·004	·002
Residual difference (— Meteorological Office)	— ·001	+ ·001	·000	·000
Mean monthly difference between simultaneous Barograph and Standard Barometer readings - - - - - -	·001	·002	·002	·002

	ABERDEEN.		FALMOUTH.		KEW.		VALENCIA.	
THERMOGRAPH :—								
Action of Instrument - - -	Good.		Good.		Good.		Good.	
Character of Photography - -	Do.		Do.		Do.		Fair.	
Records deficient :—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock - - -	0	0	2 hrs.	2 hrs.	0	0	26 hrs.	26 hrs.
„ failure of light - - -	10 hrs.	0	0	0	0	0	2 hrs.	8 hrs.
„ imperfectly moistened bulbs -	—	8 hrs.	—	2 hrs.	—	21 hrs.	—	2 hrs.
„ partially frozen bulbs - -	—	63 hrs.	—	22 hrs.	—	87 hrs.	—	0
„ other causes - - -	5 hrs.	5 hrs.	1 hr.	2 hrs.	10 hrs.	7 hrs.	8 hrs.	9 hrs.
Number of errors discovered :—								
In entry of standards - - -	0	0	1	0	0	0	68	64
„ maxima and minima - - -	4	—	10	—	7	—	14	—
By general examination - - -	2	0	8	13	2	6	26	21
Results of 40 re-measurements :—								
Greatest difference - - -	0·2	0·2	0·3	0·2	0·3	0·4	0·4	0·3
Mean difference irrespective of sign -	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (— Meteorological Office)	—0·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings - - - - -	0·1	0·2	0·1	0·1	0·1	0·2	0·3	0·2

Aberdeen.

The work generally was very satisfactory.

Armagh.

Anemograph.—The velocity traces were intermittent at low rates, owing to a slight mechanical defect. The velocities recorded are very much lower than at the other observatories.

Rain-gauge.—The traces are very faint.

Falmouth.

Anemograph.—During July and August both the direction and velocity traces are tabulated ten minutes too early, the pricker being bent. The defect was not allowed for when the hourly values were tabulated, neither was attention drawn to it, although known to the officials at the observatory.

Rain-gauge.—The differences between the records by the Beckley and check gauges are very great at times. Attention was frequently drawn to the subject, but the cause was not discovered. The traces generally are unsteady, and the attachment of the curves faulty.

Kew.

Anemograph and *Barograph.*—The regulation of the clock or record of the times of changing the curves was unsatisfactory.

Thermograph.—A loss of the dry trace for five hours is accounted for by "Mirror turned, probably by cat."

Valencia.

Rain-gauge.—The traces are faint.

Barograph.—The photography was not satisfactory, and curves much disfigured by finger-marks. The readings of the standard barometer have had to be rejected during July, August, and September, in consequence of the slipping of the attached thermometer and the consequent doubt as to the correction for temperature.

General.

There is evidence from time to time that the rules are not strictly adhered to at some observatories, this being most apparent in the subsidiary sheets, errors of the "A" values being repeated in the "B" column.

(Signed) T. E. ALLEN.

Mr. Scott was instructed to make arrangements for the issue of Hay Harvest Forecasts, as in previous years.

Submitted—The following list of publications which had been received since the last meeting :—

Contributions to meteorology, by E. Loomis. Chapter iii. Revised edition.

Report on the Bore of the Tsien-Tang Kiang by Commander Moore, R.N.

Bibliography of meteorology. A classed catalogue of the printed literature of meteorology from the origin of printing to the close of 1881 ; with a supplement to the close of 1887, and an author index. Part i. Temperature. Prepared and issued by the Chief Signal Office, U.S.A.

List of books and articles on climatology and meteorology in the Library of the Surgeon General's Office, U.S.A.

Meteorological tables for West Cornwall and the Scilly Islands for 1888, by W. L. Fox.

Résumé des communications sur le Grönland. Neuvième partie. Sur l'expédition entreprise en 1883–85 sur la côte orientale du Grönland.

Rousdon Observatory, Devon. Meteorological observations for the year 1888, by C. E. Peek.

Vergleichende Resultate der durch Schätzung erhaltenen Daten über den mittleren Bewölkungsgrad des Himmels und der Aufzeichnungen des Sonnenscheinautographen von R. Billwiller.

Welche Zuverlässigkeit besitzt die abendliche Thaupunkts bestimmung als Anhaltspunkt für Stellung der Nachtfrostprognose ? Von Dr. E. Wollny.

Untersuchungen über den Einfluss der Pflanzendecke und der Beschattung auf die physikalischen Eigenschaften des Bodens. Dritte Mittheilung. Von Dr. E. Wollny.

May 15, 1889.

63, *Victoria Street, May* 29, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 15) were read and confirmed.

A draft reply to the circular from the Chief Signal Office (Minutes, p. 15) was approved. (P.C. 1113.)

DEAR SIR,

IN reply to your letter of April 26, I am instructed by the Council to supply you with the following answers to the queries contained therein.

First.—The observations are made at 8h. a.m., 2h. p.m., and 6h. p.m.

NOTE.—The postal telegraphic offices are, generally speaking, not opened before 8h. a.m., and are closed at 8h. p.m.

Second.—Forecasts are prepared three times daily on week days, viz., at 11h. a.m., 3h. 30m. p.m., and 8h. 30m. p.m. Only those prepared at 11h. a.m. and 8h. 30m. p.m. are issued to the public, except in the summer during the harvest. (See answer to questions 3 and 4.)

On Sundays the only forecasts drawn out are those at 8h. 30m. p.m. for publication on Monday mornings. The Sunday morning observations are used as data for the issue of storm warning only.

The afternoon service is suspended on Sundays.

Third and *Fourth.*—The 8h. 30m. p.m. forecasts are supplied at the Office gratuitously to the newspapers, either directly or through the press agencies, and appear in the leading newspapers all over the kingdom on the following morning. They are not issued otherwise by the Office.

The 11h. a.m. forecasts are printed at the Office on separate flysheets, and supplied to subscribers almost exclusively resident in London, at a yearly charge of 10*s.*

They are also distributed gratuitously for exhibition to the public at various places in London, including the Meteorological Office, the Mansion House, and many of the shops of leading opticians. These forecasts are also reproduced in the lithographed Daily Weather Report, and appear in some of the evening newspapers in London, to which they are supplied gratuitously.

The 3h. 30m. p.m. forecasts are exhibited at the Meterological Office, and during the hay harvest operations are sent by telegraph at the expense of the Office to about 30 selected stations, where they are exhibited to the public.

A few persons are also supplied with these forecasts during the harvest, on the payment of a nominal fee and the cost of telegraphy.

Fifth.—The forecasts cover a period of about 24 hours. Those prepared at 11h. a.m. cover the period till noon next day. Those prepared at 3h. 30m. and 8h. 30m. p.m. refer to the next civil day.

Sixth.—The lithographed Daily Weather Report is issued to the extent of over 400 copies. Of these, 60 are supplied gratuitously for exhibition at seaports. About 150 are forwarded, also gratuitously, to scientific institutions, &c. at home and abroad, and nearly 200 are supplied to private subscribers.

The forecasts are subdivided as to the eleven districts into which the United Kingdom has been divided, on agricultural considerations. These are shown in the key map published with the Weekly Weather Report.

In the opinion of the Council, it is not possible to define forecasts sharply either as to time, locality, or phenomena.

No discussion of the rainfall has as yet been carried out with a view to showing the extent to which it is general in its distribution or partial. This would probably be found to be in some measure dependent on the season of the year, as well as on the particular atmospheric conditions under which the rain fell.

In all cases the existence of a line of hills transverse to the direction of the wind renders the fall locally more or less partial.

The draft of the Annual Report was considered. (Minutes, p. 8.)

Read—A memorandum from Mr. Baillie stating that since the last meeting six logs had been received, four of them being "excellent." Mr. Scott was directed to express the thanks of the Council to the observers.

Reported—That no storm warnings had been issued and no gales experienced since last meeting.

Submitted—The following statement showing the payments for four years ending September 1888 :—

——	1884–5.	1885–6.	1886–7.	1887–8.	Mean.
	£	£	£	£	£
Council	1,000	1,000	1,000	1,000	1,000
Secretary	800	800	800	800	800
Salaries and Wages :					
Chief clerk	333	333	333	333	333
1 junior clerk	176	183	188	193	185
2 unclassified clerks	81	92	102	106	95¼
Office keeper	109	109	109	111	109½
Messenger	65	65	65	63	64½
	764	782	797	806	787
Rent, Fuel, and Lighting :					
Rent	635	635	635	635	635
Fuel	41	69	54	58	55½
Lighting	27	28	29	22	26½
	703	732	718	715	717
Incidental and Contingent Expenses :					
Office keeper's account, cleaning, &c.	194	202	187	194	194¼
Postage	78	75	75	69	74¼
Furniture and office repairs	83	175	125	98	120¼
Carriage of parcels	18	19	17	19	18¼
Stationery Office, reports, &c.	17	38	93	34	45½
Copying synchronous observations	9	11	12	9	10¼
Books, &c.	22	14	15	17	17
International meteorology	18	11	—	22	12¾
Sundries	36	22	21	33	28
	475	567	545	495	520½
Pensions	43	43	43	67	49
Special Researches :					
Care of anemometers (bridled and Scilly)	18	17	15	10	15
Cloud observations, &c.	51	106	77	68	75½
Sunshine recorders and cards	31	35	36	18	30
Other instruments	34	29	—	10	18¼
"Aids to Weather Study"	60	—	—	—	15
"London Fogs, &c."	50	—	—	—	12½
Ben Nevis Observatory	100	100	(*a*)	(*a*)	50
U.S. telegrams	51	25	—	—	19
Electrical anemometer	—	—	96	8	26
Experiments, &c., Atlantic synchronous charts	—	—	12	3	3¾
R.E. and A.M.D. observations	—	—	91	57	37
Hygrometry	—	—	—	50	12½
Arctic work	—	—	—	64	16
Sundries	8	22	—	—	7½
(Salaries) :					
Junior clerks	158	122	127	132	134¾
Female staff	*(4) 212	(3) 189	(3) 195	(3) 205	200¼
	773	645	649	625	673

* The figures in brackets show the number of persons employed.
(*a*) Charged under Telegra[illegible]

—	1884–5.	1885–6.	1886–7.	1887–8.	Mean.
Land Meteorology:	£	£	£	£	£
Aberdeen Observatory	266	272	274	283	273¾
Armagh „	51	52	51	50	51
Falmouth „	250	308*	249	250	264¼
Kew „	415	421	408	403	411¾
Stonyhurst „	56	56	55	57	56
Valencia „	445	437	466	488	459
Glasgow „	—	56	74	75	51¼
Anemograph stations	44	61	82	92	69¾
Meteorological societies' observations	142	137	116	124	129¾
Instruments	64	61	69	23	54¼
Sundries	3	7	7	6	5¾
	1,736	1,868	1,851	1,851	1,826½
Discussions (Salaries):					
2 senior clerks	473	485	493	498	487¼
Junior clerks	† (6) 724	(6) 727	(5) 660	(6) 729	710
Unclassified clerks	† (3) 103	(3) 110	(3) 121	(2) 92	106½
	1,300	1,322	1,274	1,319	1,303¾
Weather Information and Forecasts:					
Reports from inland stations	1,024	709‡	536	589	714½
Reports sent abroad	521	581	465	519	521½
Reports from abroad	—	—	126	118	61
Storm warnings	471	427	265	268	357¾
Hay harvest forecasts	48	44	26	29	36¾
Private wires	93	91	91	91	91½
Payments to reporters, &c.	608	716§	686	644	663½
Reports to Jersey	38	36	30	34	34½
Sundry telegrams	22	14	14	17	16¾
Postages and incidental charges	229	231	232	234	231½
Instruments	57	40	23	28	37
Delivery of D.W. charts	33	—	—	—	8¼
Wrappers, printing, &c.	22	32	29	24	26¾
Sundries	18	19	9	7	13¼
Synoptic charts (foreign)	—	38	38	—	19
Ben Nevis observatory	(a)	(a)	100	100	50
U.S. reports	(a)	13	80	65	39½
	3,184	2,991	2,750	2,767	2,923
Preparation and Issue of Reports, &c. (Salaries):					
1 senior, with extra attendance	374	375	379	383	377¾
3 junior clerks, „	658	680	700	719	689¼
3 junior clerks	405	417	465	397	421
Unclassified clerks	†(2) 75	(2) 82	(1) 57	(2) 95	77¼
Messenger	45	55	59	65	56
	1,557	1,609	1,660	1,659	1,621¼
Inspections:					
Salaries (Buchan and Ley)	300	300	300	225	281¼
Travelling expenses	183	269	334	193	244¾
Contributions to R. Met. Soc.	25	25	25	25	25
	508	594	659	443	551

* Removal of instruments. † The figures in brackets show the number of persons employed.
‡ 6*d.* telegrams. § Five quarters.
(*a*) Charged under "Special Researches."

—	1884–5.	1885–6.	1886–7.	1887–8.	Mean.
Ocean Meteorology.	£	£	£	£	£
Marine Superintendent	400	400	400	391	397¾
Assistant „	250	250	269	229	249¼
2 senior clerks	602	605	608	608	605¾
5 junior „	663	678	700	720	619¼
2 unclassified clerks	103	104	104	80	97¾
	2,018	2,037	2,081	2,028	2,041
Supply of Instruments:					
Royal Navy.					
Instruments and repairs	231	307	368	258	291
Verifications	29	34	72	14	37¼
	260	341	440	272	328¼
Mercantile Marine.					
Instruments and repairs	129	196	161	112	149½
Verifications	19	21	28	10	19½
Agents fees, &c.	159	186	146	173	166
Packing cases	21	14	11	13	14¾
Presentation labels	5	5	5	7	5½
Sundries	—	2	9	4	3¾
	333	424	360	319	359
Distant Island or Coast Stations	27	21	76*	16	35
Yearly total	15,481	15,776	15,703	15,182	15,535½
Receipts for same period	736	823	739	678	744
Net expenditure†	14,745	14,953	14,964	14,504	14,791½
Total cash balance at end of September in each year	2,191	2,475	2,816	3,582	2,766

* Heligoland anemograph, &c.

† The items charged under the "Commissions" account are not included [as these only affect the Office expenditure in so far as the small charge for doing the work].

Submitted—The following list of publications which had been received since the last meeting:—

Yorkshire Phil. Soc.—Annual report for 1888.

Lang, C.—Bericht über die Thätigkeit der k. bayerischen meteor. Centralstation im Jahre 1888.

Davis, W. M.—Some American contributions to meteorology.

———.—The physical geography and climate of New England.

Schiaparelli, G. V.—Sulla distribuzione apparente delle stelle visibili ad occhio nudo.

Moore, A. W.—The climate of the Isle of Man.

Utrecht, k. nederl. meteor. Inst.—Reizen door de Chinesche Zee en het westelijk gedeelte van den Noord Pacific. Decl. I.–II.

Prince, C. L.—Summary of a meteorological journal kept at Crowborough, Sussex. 1888.

Hamburg, Deutsche Seewarte.—Aus dem Archiv der Deutschen Seewarte. VIII. Jahrg. 1885.

Hann, J.—Ueber die Luftfeuchtigkeit als klimatischer Factor.

Schreiber, P.—Neuerungen und Erfahrungen an Apparaten zur Prüfung von Thermometern und Aneroidbarometern, Windfahne und Windstärkemesser, Registrirapparaten von Richard frères und dem Barometer Wild-Fuess.

Reuter, F.—Obs. meteor. faites à Luxembourg. 1874–83. Moyennes de la période de 1854–1883. 2 vols.

Marinos, Sp. P.—Meteōrologikē epopsis tēs poleōs Kerkuras kata ta etē 1887 kai 1888. Meteorological review of the city of Corfu for the years 1887 and 1888.

Calcutta, Meteorological Office.—Report on the meteorology of India in 1887. By John Eliot.

63, *Victoria Street, June* 19, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 29) were read and confirmed.

The draft Report of the Council for the year 1888–9 was reconsidered and approved (Minutes, p. 19), and the Secretary was instructed to forward it to the Royal Society. (P.C. 1223.)

Professor Darwin made a verbal communication relative to the report from Mr. Dines on the testing the bridled anemometer (Minutes, p. 15), and it was resolved that Mr. Dines be requested to attend the next meeting of the Council.

Reported—That since last meeting five logs had been received, three of them being excellent. The Secretary was instructed to express the thanks of the Council to the observers.

Submitted—The following summary of the forecast results for the eight years, 1881–88, showing the proportion of totally and partially (more than half) successful forecasts in each month:—

	1881.			1882.			1883.			1884.		
	a.	b.	a + b.	a.	b.	a + b.	a.	b.	a + b.	a.	b.	a + b.
January	27	42	69	30	47	77	35	36	71	43	36	79
February	35	41	76	33	48	81	46	36	82	42	34	76
March	36	40	76	39	41	80	48	32	80	53	31	84
April	36	40	76	52	33	85	49	32	81	51	29	80
May	43	38	81	49	35	84	52	31	83	56	25	81
June	34	45	79	52	33	85	50	34	84	60	23	83
July	35	38	73	52	32	84	55	31	86	55	31	86
August	29	44	73	46	36	82	45	36	81	50	32	82
September	33	45	78	40	33	73	45	33	78	50	28	78
October	35	39	74	36	38	74	47	34	81	50	34	84
November	30	48	78	43	37	80	50	31	81	47	33	80
December	30	49	79	47	33	80	48	30	78	42	35	77
Year	34	42	76	43	37	80	48	33	81	50	31	81

(*continued.*)

	1885.			1886.			1887.			1888.		
	a.	b.	a + b.	a.	b.	a + b.	a.	b.	a + b.	a.	b.	a + b.
January	48	36	84	51	29	80	45	35	80	59	28	87
February	44	34	78	51	28	79	53	32	85	50	34	84
March	53	32	85	52	30	82	49	37	86	50	27	77
April	49	37	86	52	32	84	53	33	86	48	36	84
May	58	30	88	45	35	80	59	26	85	53	30	83
June	52	31	83	57	28	85	64	25	89	53	27	80
July	57	30	87	56	26	82	51	32	83	52	30	82
August	51	31	82	53	29	82	54	30	84	48	37	85
September	42	40	82	49	32	81	47	33	80	52	32	84
October	44	37	81	43	30	73	55	34	89	56	28	84
November	48	35	83	39	38	77	45	35	80	48	34	82
December	52	33	85	44	34	78	44	34	78	44	31	75
Year	50	34	84	49	31	80	52	32	84	51	31	82

Read—Letter 1086 from the Royal Meteorological Society, asking if the Council would allow 25*l.*, as in former years, towards the cost of inspection of the Society's stations.—Approved (P.C. 1236).

Submitted—The following statements of work during May 1889 :—

MARINE BRANCH.

June 19th, 1889.

Examined 14 new logs and 1 lighthouse register.

Preparing and extracting Red Sea data contained in Office and Admiralty logs.

Charting observations of sea temperature, &c. in the vicinity of Cape Guardafui, and extracting remarks bearing upon various phenomena on nearing the land.

Preparing and charting currents in all oceans from Office and Admiralty logs.

Specimen of "Instructions for keeping a Meteorological Log," prepared and forwarded to the Stationery Office.

Copying hydrographical remarks from logs 7523 and 7527 for the Admiralty, and notices on the use of oil at sea from logs 7348 and 7349 for the *Shipping Gazette*.

Preparing diagrams to illustrate Captain Toynbee's meteorological lectures.

(Signed) CHAS. HARDING.

The Marine Superintendent.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 31st May 1889.)

Monthly Weather Summaries :—

1888. *January* and *February*.—Gone "for Press."

„ *March*.—Proof of plate received.

1889. *February* and *March*.—Sent "for Press."

April.—Partially done. Delayed by illness of Mr. Francis, holidays, &c.

Weekly Weather Report, 1889.—Numbers all issued promptly to date. Appendices all kept well in hand.

Daily Weather Report.—Issued promptly to date; corrections and additions for April issued.

Primary Checking of Storm Warnings, 1889.—Done to date and reports handed in.

Final Checking of Storm Warnings, 1888.—Nearly completed.

Investigation as to Prevalence of Fog, &c.—In abeyance; awaiting completion of Storm Signal Checking, 1889.

The work of this Branch has been greatly impeded (1) by the occurrence of the Queen's birthday holiday, and (2) by sickness, mainly of Mr. Francis.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

June 1st, 1889.

Observatory Returns.—Proof of "Hourly Readings" revised to end of November 1886. The mean values and the hourly figures for vapour tension are calculated to the end of the year, and the sheets are now being copied for the printer.

Harmonic Analyser.—The non-periodicity corrections for the temperature coefficients for the five-day periods of the years 1871–82 have been calculated, and are now being applied.

Quarterly Weather Report.—The general summary for Part I., 1880, is in hand, but not far advanced. A good deal of work has been done to chart plates for Part II.

Miscellaneous.—Sunshine returns, and matters connected with the bridled anemometer and anemograms from ordinary instruments, have occupied a good deal of time.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

June 1st, 1889.

Examinations.

December 1887 to *March* 1888.—Completed.

Weekly examination (on receipt) of curves and documents from all stations.

Reports.

December 1887 to *March* 1888.—"*Notes of Errors*" to all observatories and monthly reports thereon.

The subject of the defective action of the Kew anemometer, and re-calculation of the Valencia wet-bulb zero-line values, have also engaged our attention.

(Signed) T. E. ALLEN.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

A + B (successful) - - - -	2
C (failures) - - - - -	2

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
19th June 1889.

Submitted—The following list of publications which had been received since the last meeting :—

Lang, C.—Klimatische und meteorologische Verhältnisse.
Hayden, E.—Tropical cyclones.
Stonyhurst College Observatory.—Results of meteorological, magnetical, and solar observations by the Rev. S. J. Perry, 1888.
Zürich.—Bericht über die Verhandlungen des internationalen meteorologischen Comités. Herausgegeben von Dr. Neumayer.
Vienna, K. K. geographische Gesellschaft.—Mittheilungen, 1888.
Riggenbach, A.—Resultate aus 112 jährigen Gewitteraufzeichnungen in Basel.
Calcutta, Meteorological Office.—Indian Meteorological Memoirs. Vol. iv. Part vi.
Bombay, Government Observatory.—Magnetical and meteorological observations, 1887.
Arata, P. N.—El clima y las condiciones higiénicas de la ciudad de Buenos Aires.
Gonzalez, B. G.—Resúmen de 11 años de observaciones meteorologicas en el Colegio del Estado de Puebla.
Horn, F.—Beobachtungen über Gewitter in Bayern, Württemberg und Baden während des Jahres 1888.
—— Beobachtungen über Gewitter und Hagelschläge in Bayern während der Jahre 1880–88.
Oxford, Radcliffe Observatory.—Results of meteorological observations in the year 1885.
Tripp, W. B.—South American rainfall, south of the tropics.

63, *Victoria Street, July* 3, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 19) were read and confirmed.

Read—The following letter:—

(M.O. 1144.)

Department of Science and Art, London, S.W.,
26th June 1889.

SIR,

I AM directed by the Solar Physics Committee to acquaint you that they have in their possession two of Violle's boules conjuguées, which they will be much obliged if the Meteorological Council will have the goodness to test as to constancy of action. I am to ask you to be good enough to inform me whether they may be sent to the offices of the Council.

I am, &c.
(Signed) FRANK REDE FOWKE,
Secretary, Solar Physics Committee.

The Secretary, Meteorological Council,
116, Victoria Street, S.W.

Mr. Scott reported that only one of Violle's instruments had arrived, and that he had written (P.C. 1287) to state that unless a second instrument was supplied, the test as to constancy of action could not be carried out.—Approved.

Mr. W. H. Dines attended by invitation, and, after some conversation, it was agreed that he should carry on his experiments on the bridled anemometer during the autumn, and also extend them to the pressure of wind on plates.

The sum of 25*l.* was placed at his disposal, with the understanding that if more were required Mr. Dines would inform the Council.

Mr. Scott reported that seven logs had been received since last meeting, six of them being "excellent." He was instructed to express the thanks of the Council to the observers.

Reported—That since last meeting no warnings had been issued and no gales experienced.

Submitted—The following statements of work during June 1889:—

MARINE BRANCH.

July 2nd, 1889.

Examined 11 new logs.

Proofs of lithographed charts of Arabian Sea (Aden cyclone) for May 15 to 18, 1885, received, examined, and passed for press.

Preparation and extraction of Red Sea data in Office and Admiralty logs, and discussion of observations of ships while at anchor. Drawing a chart of the area under discussion, scale 1 degree = 1 inch, for the final plotting of the observations.

Preparing and charting ocean currents in Office and Admiralty logs.

Making a reduction of the charts of sea temperature, &c., for the neighbourhood of Cape Guardafui.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 30th June 1889.)

Monthly Weather Summary:—

1888, *January* and *February*.—Published.

March.—Printed; proof undergoing revise.

April.—About half done.

Monthly Weather Summary:—

1889, *February* and *March*.—Published.
April.—Printed; proof undergoing revise.
May.—About half ready for printer.
June.—Preparation of tables well in hand.

Weekly Weather Report.—Numbers issued promptly. Appendices all well in hand.

Daily Weather Report.—All issued promptly to date. Corrections and additions sheet for May issued.

As there is to be a change of lithographers on July 1, it is possible there may be some little trouble in getting the first few numbers out, especially as the Stationery Office did not put us in communication with the new firm (Messrs. Judd & Co.) till later than we could have wished.

Primary Checking of Storm Warnings, 1889—Done to date.

Final Checking of Storm Warnings, 1888.—Done, and results handed in.

Annual Report, 1888.—Preparation of Appendices, revising proof, &c. of text. Done.

Investigation as to Prevalence of Fog.—Still in abeyance owing to want of staff.

Mr. Francis returned to duty on June 3rd, after three weeks illness. Mr. Brodie has taken one week of his summer vacation, and several other of the clerks have commenced taking their vacations.

(Signed) FREDC. GASTER.

1st July 1889.

PANTAGRAPH ROOM.

July 1st, 1889.

Observatory Returns.—Hourly Readings to end of December 1886 copied and forwarded to printer. The annual tables, in English and French measures, calculated and sent to printer. Proof revised for greater part of December, and the "Part" nearly ready for press.

Quarterly Weather Report.—The letterpress, tables, and plates of Part I., 1880, ready for printer. Chart plates for Part II. nearly completed.

Harmonic Analyser.—The application of the non-periodic corrections to the five-day temperature coefficients for 1871–82 completed. The calculation of the angle (t) from the corrected coefficients is now in progress.

Miscellaneous.—Plate engraved for Annual Report. Inspection notes prepared for sunshine recorder stations. Some time occupied on sunshine records and on anemograms.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

July 1st, 1889.

Examinations.

April—June 1888.—Completed.
April and *May* 1889.—Partial examination of the Valencia work for the Registrar-General of Ireland.
Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

April and *May* 1888.—"*Notes of Errors*" to all observatories and monthly reports thereon.
The defective action of the anemometers at the various stations from 1874 to 1882 engaged some amount of time.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting:—

Grant, R.—Analysis of the results of meteorological observations made with self-recording instruments at the Glasgow University Observatory in the year 1888.
Brussels, Observatoire Royal.—Annuaire. 1886–89.
Hamburg, Deutsche Seewarte.—Aus dem Archiv der deutschen Seewarte. ix.–x. Jahrg. 1886, 1887.
Upsala, Observatoire Météorologique.—Bulletin mensuel. Vol. xx., 1888.
Hann, J.—Bericht über die Fortschritte der geographischen Meteorologie. Umfasst die Jahre 1886, 1887, 1888.
Monaco, S. A. le Prince Albert de.—Sur les courants superficiels de l'Atlantique Nord.
Falmouth, R. Cornwall Polytechnic Society.—56th Annual Report, 1888.
Stockholm, K. Svenska Vetenskaps - Akademien. — Meteorologiska Iakttagelser i Sverige. Bd. xxvi. 1884.
Fineman, C. G.—Spegelnefoskopet och dess användning vid molnobservationer.
Luvini, J.—Les taches solaires et les variations du magnétisme terrestre.

Submitted—The following report on the 8.30 p.m. forecasts for May 1889:—

The letters used have the following signification:—

a=complete success. | **c**=partial failure.
b=partial (*i.e.* more than half) success. | **d**=total failure.

Districts.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Average Forecast.	
Scotland, N.	a	68	45	57	89
,,	b	23	42	32	
,,	c	6	7	7	
,,	d	3	6	4	
Scotland, E.	a	65	61	63	89
,,	b	29	23	26	
,,	c	3	6	5	
,,	d	3	10	6	
England, N.E.	a	61	32	47	82
,,	b	29	42	35	
,,	c	10	16	13	
,,	d	0	10	5	
England, E.	a	71	55	63	83
,,	b	16	23	20	
,,	c	10	16	13	
,,	d	3	6	4	
Midland Counties	a	74	52	63	91
,, ,,	b	20	35	28	
,, ,,	c	3	10	6	
,, ,,	d	3	3	3	
England, S.	a	68	61	65	91
,,	b	29	23	26	
,,	c	0	13	6	
,,	d	3	3	3	
Scotland, W.	a	52	45	49	81
,,	b	35	29	32	
,,	c	7	16	11	
,,	d	6	10	8	
England, N.W.	a	45	55	50	74
,,	b	32	16	24	
,,	c	20	10	15	
,,	d	3	19	11	
England, S.W.	a	61	45	53	79
,,	b	29	23	26	
,,	c	7	23	15	
,,	d	3	9	6	
Ireland, N.	a	36	55	46	78
,,	b	32	32	32	
,,	c	26	7	16	
,,	d	6	6	6	
Ireland, S.	a	45	42	44	78
,,	b	29	39	34	
,,	c	16	6	11	
,,	d	10	13	11	
Summary.					
British Isles	a	59	50	55	83
,,	b	27	30	28	
,,	c	10	12	11	
,,	d	4	8	6	

Submitted—The following Statement respecting the Records from January to June, 1888, received from the Self-recording Observatories (see Minutes, 21st December, 1868, 20th November, 1876, 3rd January, 1883, and 6th March, 1889) :—

January-June, 1888.	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	Fair.	Good.	Good.	Good.	Fair.	Good.	Good.
Records deficient :—										
Due to stoppage of clock	0	0	1 hr.	1 hr.	0	0	0	0	0	0
„ other causes	0	0	1 hr.	2 hrs.	0	0	10 hrs.	21 hrs.	2 hrs.	2 hrs.
Number of errors discovered :—										
By general examination	11	9	12	21	12	8	3	3	14	3
Results of 40 Remeasurements :—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0
Mean difference irrespective of sign	0·2	0·3	0·1	0·5	0·2	0·4	0·1	0·6	0·1	0·6
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	0·0	0·0	+0·1	0·0	+0·1	0·0	+0·1
Orientation verified	Monthly	—	Monthly	—	Monthly	—	Monthly	—	Monthly	—
RAIN GAUGE :—										
Action of Instrument	Good.		Good.		Indifferent.		Good.		Good.	
Records deficient :—										
Due to stoppage of clock	0		0		0		0		22 hrs.	
„ other causes	0		0		0		0		0	
Number of errors discovered :—										
By general examination	21		1		18		1		8	

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH :—				
Action of Instrument	Good.	Good.	Good.	Good.
Character of Photography	Do.	Do.	Do.	Fair to Bad.
Records deficient :—				
Due to stoppage of clock	0	0	0	0
„ failure of light	0	0	0	1 hr.
„ other causes	8 hrs.	1 hr.	0	3 hrs.
Number of errors discovered :—				
In entry of standards	2	12	1	0
„ calculating residuals	0	8	0	1
„ applying „	5	11	0	2
By general examination	7	87	3	24
Results of 40 Remeasurements :—				
Greatest difference	·006	·010	·008	·012
Mean difference irrespective of sign	·002	·002	·003	·002
Residual difference (—Meteorological Office)	—·001	·000	+·001	—·001
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·001	·002	·002	·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH :—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Fair to Bad.	
Records deficient :—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	16 hrs.	16 hrs.	0	0	16 hrs.	16 hrs.	6 hrs.	6 hrs.
„ failure of light	0	0	1 hr.	1 hr.	0	0	0	0
„ imperfectly moistened bulbs	—	38 hrs.	—	12 hrs.	—	64 hrs.	—	0
„ partially frozen bulbs	—	203 hrs.	—	72 hrs	—	209 hrs.	—	12 hrs.
„ other causes	10 hrs.	1 hr.	0	0	5 hrs.	5 hrs.	4 hrs.	10 hrs.
Number of errors discovered :—								
In entry of standards	0	0	5	10	0	0	2	10
„ maxima and minima	6	—	15	—	4	—	11	—
By general examination	7	18	15	19	1	2	32	16
Results of 40 Remeasurements :—								
Greatest difference	0·2	0·2	0·3	0·3	0·3	0·3	0·3	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	0·0	0·0	0·0	0·0	—0·1	+0·1	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·2	0·2	0·1	0·2	0·1	0·1	0·1	0·2

Examination Branch,
3rd July, 1889.

SELF-RECORDING OBSERVATORY RECORDS.

Aberdeen.

The work generally at this station was satisfactory. Occasionally the photographic curves are changed too near the hour, thus causing the loss of the 11 a.m. hourly values.

Anemograph.—April 14th, new fans and spindle fitted.

Thermograph.—Many of the curves are disfigured by secondary images, probably due to the lamp black having been rubbed off the tube.

Barograph.—Occasionally the definition of the curves is not good.

Armagh.

In the absence of Dr. Dreyer, the observations are taken by the Rev. C. Faris, who is unable to attend at the usual hours; consequently at such times the curves are changed at 9.30 a.m.

Anemograph.—The velocities recorded at this observatory are lower than at the other stations. The velocity traces are intermittent at low rates, owing to a slight mechanical defect.

Rain-gauge.—The melted snow is not passed through the gauge, and the trace is therefore lost; the attachment of the papers to the cylinder is at times very unsatisfactory.

Falmouth.

The work generally is satisfactory. The barometer residuals, however, vary in a most sudden and erratic manner, the cause of which Mr. Kitto has been unable to discover.

Barograph.—A second edge to lower part of trace is apparent on many of the curves.

Thermograph.—Some of the curves are disfigured by secondary images.

Rain-gauge.—Trace irregular, and bagging much too prevalent, indicating indifferent attachment of the papers to the cylinder.

Kew.

The regulation of the clocks generally is unsatisfactory. Mr. Whipple states that new clocks are needed.

Rain-gauge.—April 16th, two air holes were drilled in the discharger to prevent its discharging on removal from the gauge.

Valencia.

As in previous months the work is not up to the general standard. The photography is far from good and the curves are greatly disfigured by finger-marks. The attachment of the rain papers to the cylinder requires more care.

(Signed) T. E. ALLEN.

Reported—That the cash accounts for the six months ended the 31st March 1889 had been audited by the chairman and Mr. Galton and would be sent to the Treasury, for the Audit Office. The receipts for the six months, exclusive of a balance of 3,582*l.* 8*s.* 0*d.* on the 1st October 1888, amounted to 8,877*l.* 13*s.* 1*d.* The payments amounted to 8,991*l.* 8*s.* 4*d.*, leaving a balance of 3,468*l.* 12*s.* 9*d.* in hand and at the bank on the 1st April 1889.

63, *Victoria Street, July* 17, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (July 3) were read and confirmed.

Read—Letter 1222 from the Board of Trade, enclosing copy of a letter (with enclosures) from the Colonial Office, dated July 5, inquiring probable cost of establishing and maintaining a meteorological station at Bermuda, in order to supply telegraphic reports from thence to Halifax, as soon as the projected cable from Bermuda to Halifax shall have been laid.

The Secretary was instructed to send the following reply (P.C. 1482) :—

(M.O. 1222.)

SIR,

YOUR letter of the 9th instant, relative to the proposed establishment of a meteorological station at Bermuda, having been considered by the Meteorological Council, I am directed to convey to you the following expression of the opinions they have formed on the questions submitted to them.

The Council can have no doubt that advantage should be taken of the establishment of telegraphic communication with Bermuda to obtain regular meteorological reports from that island to be utilized in improving the forecasts of weather to be expected on the coasts of the North Atlantic. They consequently do not hesitate to support the proposal of the Government of the Dominion of Canada to form a meteorological station at Bermuda from which regular reports should be transmitted to Halifax and Toronto.

The Council are not in possession of precise information as to the system of forecasting adopted by the Central Canadian Meteorological Office at Toronto, but it is presumed that information is obtained from the United States Bureau at Washington as to the advance of any atmospheric disturbances from the south likely to have influence on the weather in Canada.

It is necessary to remark that for any reliable forecast of changes of weather likely to result in Canada from disturbances in the neighbourhood of Bermuda, it would be necessary to consider the effect of changes that might occur in the intervening region, and the atmospheric conditions along the coasts of the United States. These are systematically taken cognizance of at the office at Washington, which would unquestionably desire to be furnished with any meteorological reports sent from Bermuda. The well-known liberality of the Washington office leads the Council to expect that information of the nature now in question, which that office might obtain, would be readily communicated to Toronto, and combined with this, the reports from Bermuda might reasonably be expected to supply very valuable data for forecasting the weather on the coasts of Canada, the importance of accuracy in which to the ships of Her Majesty's Navy as well as the Mercantile Marine is indisputable.

With reference to the cost of establishing and maintaining such a meteorological station, I am to state the usual equipment of instruments for a telegraphic reporting station is about 12*l.*; no special building is needed, and suitable places for the instruments could no doubt readily be found in or near the telegraph office. Further, as the requisite observations would only occupy a few minutes two or three times a day, it would probably be possible to secure the services of one or other of the telegraphic signallers by a small payment, such as is usual at similar stations in this country, which would not exceed 15*l.* to 20*l.* yearly.

I am, &c.,
(Signed) ROBERT H. SCOTT,
Secretary.

The Assistant Secretary,
Marine Department,
Board of Trade.

The subject of the cost of printing (Minutes, p. 14) was again taken into consideration, and the Chairman stated that having examined carefully into the preparation of the series of "Meteorological Observations from Stations of the Second Order," of which the volume for 1885 was just completed, he recommended to the Council that the size of this volume be reduced by limiting the number of stations from whence observations were published in full (Form A). This suggestion was adopted, and the following was fixed as the list of the stations of this character to be included in the volume for 1886. This action will result in an economy of about 50 pages of tables.

STATIONS for PUBLICATION in detail on FORM A. 21 in Number.

Stations.	In connexion with	Years already published in detail.	Remarks.
Glasgow	M. O.	10	Formerly observatories. 10 years hourly readings already published.
Stonyhurst	M. O.	12	Continuous records of pressure, temperature, wind, and rainfall still available, except for Armagh, which furnishes wind and rain only.
Armagh	M. O.	12	
Dunrobin Castle	Scott. M. S.	6	
Braemar	Scott. M. S.	6	High-level station (1,113 feet).
Dundee	Scott. M. S.	6	
Wolfelee	Scott. M. S.	—	
Scarborough	R. Met. Soc.	5	
Hillington	R. Met. Soc.	9	
Churchstoke	R. Met. Soc.	10	Sutton Coldfield to be substituted for Churchstoke for 1889.
Carmarthen	R. Met. Soc.	11	
Margate	R. Met. Soc.	4	
Princetown (Dartmoor)	R. Met. Soc.	7	High-level station, 1,395 feet. The only high-level station available in the south of England.
Swanbister	M. O.	—	This is the most northern station available, and there is a continuous record of wind.
Laudale	M. O.	7	
Douglas (Isle of Man)	M. O.	8	
Southampton	M. O.	8	At both these stations there are long series of observations available, taken by the officers of Ordnance Survey.
Dublin (Phœnix Park)	M. O.	—	
Markree Castle	M. O.	11	
Parsonstown	M. O.	13	
Londonderry	M. O.	7	

The Secretary was instructed to send the following reply (P.C. 1511) to the letter from the Treasury (Minutes, 1888, p. 125):—

(M.O. 480.)

SIR,

ON receipt of your letter dated the 11th March last, No. 4164, relative to the cost of printing and other work performed by the Stationery Office for the Meteorological Office, the Meteorological Council took immediate steps for inquiring into the matter specially referred to in that letter.

To enable them to reply to the inquiries of the Lords Commissioners of Her Majesty's Treasury the Council desired, if possible, to obtain from the Stationery Office information somewhat in detail as to the cost of the various publications issued from this Office during the years to which special reference is made in your letter. This necessarily occupied some time, but the results have not been such as to admit of any very precise reply being given as to the cause of the increase of expense in printing which is noticed as having taken place in 1881–2 and 1882–3.

The Council have no doubt, however, that the increase of charge after the first three years to which allusion is made, was, speaking generally, due to the increased activity of the Office after its re-organization in 1877. The application of the increased funds placed at the disposal of the Office necessarily involved some expansion of its operations to meet which those funds were specially assigned, and from the nature of the duties that devolve on the Office, the performance of more work involves an increase in the volume of its publications.

In 1881–2 a change was made in the form of one of the publications of the Office (the Quarterly Weather Report), which involved a large increase to the copperplate engraving and was doubtless a cause of increased expenditure. This has now been discontinued. In 1882–3 a special publication was issued relating to the sea off the Cape of Good Hope which was accompanied by plates which also must have led to additional charge. In this year, however, the principal increase appears to have been due to the issue during it of publications appertaining to former years, which had fallen into arrear. It is not possible to distinguish properly the yearly cost of the various publications, which in some cases extended over two or more years, and in the absence of the actual figures, which the Council has not been able to obtain, the best way of judging of this charge will probably be to take as a guide the number of publications issued in the successive years, and their aggregate selling price as fixed by the Stationery Office, which will no doubt be some measure of their cost. A statement of this description is annexed, which also indicates the publications which were the most costly.

With reference to the inquiry as to the increased size and cost of the Weekly Weather Report, the Council desire to state that the changes last made were adopted with a view of bringing it more completely up to the standard of information that the present requirements of students of meteorology demand, in relation to the various practical objects and occupations in which the

conditions of the weather are important or influential. Among these agriculture holds a very prominent place, and the reports have been specially framed in communication with persons conversant with the bearing of meteorology on agriculture in view of meeting their wishes.

The attention of the Council having been more particularly directed to this portion of your letter, they have adopted the conclusion that any less full illustration of the conditions of weather over the British Isles and the adjacent countries which influence it, than is now supplied in the Weekly Weather Report, could not be regarded as satisfactory or sufficient, and they deprecate any economy in this direction.

At the same time the Council is fully impressed with the duty imposed upon them of reducing the cost of printing as far as practicable, and they have undertaken a careful revision of their periodical publications which they have every reason to believe will result in a substantial reduction of the charge incurred in their behalf at the Stationery Office. The subject will continue to have their attention, and they desire to assure my Lords that every effort will be made on their part to prevent any printing which is not really requisite for the due discharge of the service entrusted to them.

As to the future, the Council have no reason to anticipate any increased demand for printing, but, as already mentioned, they look to sensible reduction. In modifying the forms of their publications, however, caution is very necessary, and when the revision now proceeding has been completed they will report its results, and endeavour to supply a standard such as my Lords appear to desire. It may be added that it would assist the Council in controlling this element of expenditure if the Stationery Office from time to time communicated to the Meteorological Office the cost of the work done for it, of which at present it has no means of obtaining any knowledge.

I am, &c.

(Signed) R. STRACHEY,
Chairman, Meteorological Council.

F. Mowatt, Esq., C.B.,
Assistant Secretary, Treasury.

NUMBER and SELLING PRICE of PUBLICATIONS of the METEOROLOGICAL OFFICE from 1877 to 1887.

Year.	Number.	Aggregate Price.
		£ s. d.
1877	3	3 5 0
1878	2	0 4 6
1879	2	1 1 0
1880	—	—
1881	5	3 8 6
1882	9	19 14 0
1883	5	6 16 6
1884	2	2 13 0
1885	4	8 8 6
1886	2	3 14 6
1887	3	2 8 6

SPECIAL PUBLICATIONS.

		£	s.	d.
1877.	Meteorology of Arctic Regions, 5 Parts - - - - -	1	9	0
1877.	Do. North Atlantic, 31 Charts - - - -	0	15	0
1877.	Quarterly Weather Report, 4 Parts - - - - -	1	1	0
1882.	Do. do. (3 years) 13 Parts and Appendices -	9	9	0
	[This charge is spread over several years.]			
1881.	Observations at Stations of Second Order - - - -	1	0	0
1882.	Do. do. - - - -	1	14	6
1884.	Do. do. - - - -	1	15	0
1885.	Do. do. - - - -	1	15	0
1886.	Do. do. - - - -	1	10	0
1887.	Do. do. - - - -	1	12	0
1882.	Hourly Readings of Observations at Special Observatories, 1881, 4 Parts -	3	12	6
1882.	Do. do. do. 1882, 4 Parts -	4	8	6
1883.	Do. do. do. 1883, 4 Parts -	4	13	0
1885.	Do. do. do. 1884, 4 Parts -	2	7	6
1886.	Do. do. do. 1885, 4 Parts -	2	4	6
1885.	Weather Charts of Atlantic Ocean, 4 Parts, 33 Sheets, each - -	3	8	0
1883.	Sea Temperature Charts - - - - - -	1	1	0
1887.	Barometric Pressure over Ocean - - - - - -	0	10	6
1882.	Meteorological Atlas, British Isles - - - - -	0	5	6
1881.	Rainfall Tables, British Isles - - - - - -	0	7	6

Read—The following letter (Minutes, 1888, p. 73) :—

(M.O. 1177.)

SIR, Lloyd's, E.C., July 3rd, 1889.

I SHOULD be very much obliged to you if you could favour me with a list of the meteorological instruments which ought to be established at every signal station for the purpose of taking careful observations, and also with the cost at which these can be obtained.

I think that it might be arranged that such observations should be taken at all Lloyd's Signal Stations. I should be glad to know whether, if such an arrangement could be made, it would be worth while for the Meteorological Office to pay the signalmen some small extra allowance for recording and transmitting the result of these observations to London. I think that the men would probably be satisfied with an allowance of 10*s.* per quarter or 2*l.* yearly, except in exceptional cases.

I am, &c.,
(Signed) H. M. HOZIER,
Secretary.

The Secretary,
Meteorological Office,
116, Victoria Street, S.W.

Mr. Scott was instructed to send the following reply :—

(P.C. 1400.)

SIR, Meteorological Office, 19th July 1889.

I AM instructed by the Council to inform you that the list of instruments required for their Telegraphic Reporting Stations, which would probably correspond to your proposed Signal Stations, is as follows :—

1 Mercurial barometer.
2 Thermometers (for dry and wet bulbs).
1 Maximum thermometer.
1 Minimum thermometer.
1 Thermometer screen (Stevenson's).
1 Rain-gauge.

The cost per station ought not to exceed about 12*l.* Kew certificates should be obtained for all instruments, and this Office would be prepared to assist you in procuring the necessary outfit for your stations, if requested.

The Council are hoping to hear that the station at the North Foreland has been established, as their proposal made in my letter of December 1, 1888, still remains open.

Your other stations, however, do not appear to be situated so as to be suitable for the purposes of this Office, and though duly appreciating your obliging offer of co-operation, the Council is therefore unable to take advantage of it.

As regards the suggestion that the Council should make a slight remuneration to the signalmen for making meteorological observations, I am to say that this Office pays no observers except those who send telegraphic reports, and from this rule no departure is possible.

I am, &c.,
(Signed) ROBERT H. SCOTT,
Secretary.

The Secretary, Lloyd's, E.C.

Reported—That the electrical anemometer from Valencia had been received at Kew (Minutes, p. 11), and a letter (No. 1262) from Mr. Whipple was read stating that a sum of about 25*l.* was required to put it in working order for the proposed experiments. —Sanctioned. (P.C. 1411.)

Reported—That since last meeting 12 logs had been received, 9 of them being "excellent." Mr. Scott was instructed to express the thanks of the Council to the observers, and to present to Captain Gillies a copy of the charts O. 27.

Submitted—The following list of publications which had been received since the last meeting :—

Herrmann, E.—Der plötzliche Barometerfall über Mitteleuropa am 31 Januar—1 Februar 1889.

Allahabad, Meteorological Office.—Administration report of the Meteorological Reporter to Government, North-western Provinces and Oudh, for the year 1888-89.

——— Brief sketch of the meteorology of the North-western Provinces, Oudh and Eastern Rajputana, for the year 1888.

Hong-Kong Observatory.—Report of the Director for 1888.

Vienna, K. K. Sternwarte.—Meteorologische Beobachtungen in den Jahren 1885 und 1886.

Lee, Sir J. C.—The North-west Coast of Africa.

Marriott, W., and *Ranyard, A. C.*—Photographs of lightning.

Port au Prince, Haiti.—Tägliche meteorologische Beobachtungen im Jahre 1888.

Paris, Observatoire Municipal de Montsouris.—Annuaire, 1889.

London, Admiralty.—Tide tables for the British and Irish Ports for the year 1889.

Washington, Signal Office.—Annual report. 1888.

Hepites, S. C.—Studiŭ asupra climeĭ Bucureştilor in aniĭ 1885-88. Partea i. Temperatura aerului.

Reported—That since last meeting no warnings had been issued and no storms experienced.

Submitted—The following report on the 8.30 p.m. forecasts for June 1889 :—

The letters used have the following signification :—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success. a + b.
Scotland, N.	a	50	74	62	87
,,	b	40	10	25	
,,	c	7	3	5	
,,	d	3	13	8	
Scotland, E.	a	60	57	59	84
,,	b	34	17	25	
,,	c	3	16	10	
,,	d	3	10	6	
England, N.E.	a	53	43	48	82
,,	b	27	40	34	
,,	c	20	7	13	
,,	d	0	10	5	
England, E.	a	60	60	60	87
,,	b	33	20	27	
,,	c	7	13	10	
,,	d	0	7	3	
Midland Counties	a	67	50	59	86
,,	b	27	27	27	
,,	c	6	20	13	
,,	d	0	3	1	
England, S.	a	53	60	57	97
,,	b	47	30	38	
,,	c	0	7	4	
,,	d	0	3	1	
Scotland, W.	a	57	57	57	85
,,	b	33	23	28	
,,	c	10	13	12	
,,	d	0	7	3	
England, N.W.	a	63	50	57	80
,,	b	27	20	23	
,,	c	10	10	10	
,,	d	0	20	10	
England, S.W.	a	63	53	58	87
,,	b	27	30	29	
,,	c	7	7	7	
,,	d	3	10	6	
Ireland, N.	a	53	60	57	83
,,	b	27	23	25	
,,	c	17	0	8	
,,	d	3	17	10	
Ireland, S.	a	70	60	65	81
,,	b	14	17	16	
,,	c	13	10	11	
,,	d	3	13	8	
Summary.					
British Isles	a	59	57	58	85
,,	b	31	23	27	
,,	c	9	10	10	
,,	d	1	10	5	

Submitted—The following statement of accounts for the quarter ending 30th June 1889:—

Income.	£ s. d.	£ s. d.	Expenditure.	£ s. d.	£ s. d.
Balance from year 1888-89	- - -	2,777 7 10	Administration:		
Proportion of vote for quarter - - -	- - -	3,825 0 0	Payment of Council -	250 0 0	
Repayment of expenses charged under—.			Secretary - -	200 0 0	
(1.) Incidental expenses	3 13 1		Salaries and wages -	200 5 6	
(2.) Special researches -	1 13 4		Rent, fuel, and lighting	161 11 6	
(3.) Observatories, &c.	0 2 6		Furniture and fittings	20 7 6	
		5 8 11	Incidental and contingent expenses -	74 13 3	
Supply of Weather Information:			Pensions - -	46 14 1	
			Expenses incidental to International Meteorological Congress	3 5 0	
D.W. Charts and Forecasts - -	61 0 9				956 16 10
6 p.m. Charts - -	6 5 0		Special Researches -	- - -	129 1 11
Information for Press Agencies, &c. -	23 13 8		Land Meteorology:		
Telegrams - -	75 13 1		Observatories and stations - -	540 2 7	
		166 12 6	Discussion and reduction of observations -	366 4 6	
Sale of Instruments, &c.:					906 7 1
Royal Navy account -	2 19 7		Weather Information and Forecasts:		
Mercantile Marine account - -	4 8 0		Telegraphic reports and storm warnings	554 17 1	
		7 7 7	Preparation and issue of reports and forecasts - -	446 8 2	
Commission charged on work done for Colonies, &c. - -	- - -	7 19 8			1,001 5 3
			Inspections:		
			Salaries and travelling	- - -	100 0 0
			Ocean Meteorology:		
			Discussion and reduction of observations -	396 19 0	
			Expenses incidental to the supply of instruments:		
			Proportion for care and issue of instruments -	50 0 0	
			Royal Navy -	159 16 4	
			Mercantile Marine	98 6 10	
					705 2 2
			Balance - -	- - -	2,991 3 3
		£6,789 16 6			£6,789 16 6

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council - - - -	250 0 0	By cash at Bank - - -	3,476 11 9
„ outstanding accounts or work uncompleted - - - -	244 12 3	„ „ at Office - - -	75 8 11
, Post Office (partly estimated) -	283 2 0	„ H.M. Exchequer - -	325 0 0
„ sundry creditors - - -	415 12 3	„ sundry debtors - - -	307 9 1
, balance - - - -	2,991 3 3		
	£4,184 9 9		£4,184 9 9

63, *Victoria Street, October* 23, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (July 17) were read and confirmed.

The Chairman reported that he had instituted inquiries during the vacation as to the possibility of producing the Weekly Weather Report at a rate cheaper than the present one. He submitted (Letter 1840) a specimen page of the Report, produced by lithography, and stated that the probable cost of the Report so produced would be about 8*l.* per week, instead of 20*l.* as at present, when the charts are produced separately, and the whole turned out by printing in a press.

It was resolved that the Stationery Office be requested (P.C. 2,000) to execute the work by lithography, and to commence if possible from January 1, 1890.

It was further resolved that from January 1, 1890, the weeks for the purposes of this Report should end on Saturday instead of on Monday, as at present.

Read—The following Reports:—

REPORT of INSPECTIONS, IRELAND and WALES.

GENTLEMEN,

I HAVE to report that I have completed the inspection of the Irish and Welsh stations, and have also visited the fishery barometers which lay in my way.

TELEGRAPH STATIONS.

Holyhead, visited August 6.—I found this station in good order. No remarks are called for.

Donaghadee, visited August 7.—This station was also satisfactory. I regret to say the health of the observer is not good.

Malin Head, visited August 12.—The new observer, Owen O'Doherty, is more satisfactory than his predecessor, J. Farren, and I hope that the station will now be useful. The instruments were in good order.

Mullaghmore, visited August 13.—This station was, as usual, in very good order.

Belmullet, visited August 15.—The instruments were all in good order and the station satisfactory.

Valencia, visited August 22, and found in good order. I authorised some necessary repairs to be carried out at the observatory.

Roche's Point, visited August 26.—The instruments were in fair order; the wet bulb was not satisfactorily mounted.

Parsonstown, visited August 28.—The observer, Harries, is attentive, and does his duty well.

St. Ann's Head, visited September 2.—This station was in good order.

STATIONS of the SECOND ORDER and WEEKLY WEATHER REPORT STATIONS.

Armagh, visited August 8.—Dr. Dreyer was absent, but I saw Mr. Faris, his assistant. The instruments were in proper order.

Colebrooke, visited August 9.—The instruments were in order. It is possible that this station may be discontinued.

Londonderry, visited August 9.—The station calls for no remark.

Markree, visited August 14.—The station was, as usual, in good order.

Currygrane, visited August 17.—The new assistant, F. Warrington, continues to work well.

Killarney, visited August 24.—The observer was absent, but the substitute was efficient and the instruments in good order.

Foynes, visited August 27.—These observations are only carried on while Lord Monteagle is residing at the place.

Parsonstown, visited August 28.—The observer, Sergeant Whelan, is failing in health.

Dublin (Fitzwilliam Square), visited August 29.—The station continues in excellent order.

Dublin, Glasnevin, visited August 29.—The only matter calling for remark is that the new gauge which was supplied in 1888 shows a larger fall than the old one, owing to difference of situation. I have directed the observer to discontinue the use of the old gauge.

Dublin, Mountjoy, visited August 29.—The only matter calling for notice is that it has been found that the anemometer, though on a high stage, registers 40 per cent. less than Holyhead.

Kilkenny, visited August 30.—The instruments were in good order, but there is no prospect of the station becoming one of the Second Order.

Waterford (Brooklawn), visited August 31.—This station, like Foynes and Kilkenny, only takes readings for the Weekly Weather Report.

St. David's, visited September 3.—This station was, as usual, quite satisfactory.

Llandovery, visited September 4.—This also is only a station for the Weekly Weather Report; as such, it is fairly satisfactory.

I visited also certain fishery barometers which lay on my route. These were Ballyglass (Broadhaven), Ballycastle (Co. Mayo), Howth, Malahide, Hakin (Milford), and Angle, Milford Haven. At the last-named station the barometer has been exposed to weather. The instrument is serviceable if not moved about.

At several of these stations lectures would be appreciated.

(Signed) ROBERT H. SCOTT.

The following table shows the results of the thermometric comparisons:—

Corrections to be applied to the readings of—

STATION.	Dry Bulb.	Wet Bulb.	Max.	Min.	Spare Ther.	REMARKS.
STATIONS OF THE SECOND ORDER.						
Armagh	−0·3	−0·5	−0·9	—	—	Grass min. 2°·5 of spirit separated.
Brookeborough	−0·2	−0·7	−0·1	+0·2	—	
Dublin (City)	−0·3	−0·4	−1·1	−0·3	—	
Dublin (Phœnix Park)	−0·9	−1·0	−0·3	−0·3	−1·0	Grass min. −1·6.
Edgeworthstown	−0·5	−0·3	−0·3	+0·6	—	Do. +0·7.
Glasnevin	−0·6	−0·5	−1·0	0	—	Do. −1·0.
Londonderry	−0·3	−0·2	+0·2	+0·3	−0·3	
Markree Castle	−0·7	−0·7	−0·2	−0·1	—	Kew standard −0·6.
Parsonstown	−0·8	−0·1	−0·8	−0·3	—	
St. David's	−0·7	−0·7	−0·4	−0·1	—	
TELEGRAPHIC REPORTING STATIONS.						
Holyhead	−0·2	−0·4	−0·6	−0·1	−0·6	
Malin Head	−0·1	−0·9	+0·1	−0·3	−0·4	New observer: ordered spare ther. 4106 to be used for wet-bulb in future.
Mullaghmore	−0·5	−0.6	−0·4	+0·4	−0·6	
Belmullet	−0·6	−0·5	−0·4	−0·5	—	No spare ther.
Donaghadee	−0·8	−1·1	−1·1	−0·4	−0·7	
Parsonstown	−0·8	−0·1	−0·8	−0·3	—	
Valencia	−0·8	−0·5	−0·5	−0·1	+0·2	
Roche's Point	−0·9	−0·8	−0·8	+0·2	—	No spare ther.
St. Ann's Head	−0·2	0·0	0·0	+0·3	−0·1	
WEEKLY WEATHER REPORT STATIONS.						
Londonderry	−0·4	−0·3	+0·1	+0·2	−0.4 Grass Ther.	
Armagh	−0·4	−0·6	−1·0	?	−0.3	Casella's mercurial min.: — not read.
Colebrooke	−0·3	−0·8	−0·2	+0·1	—	2°·5 of spirit separated in grass.
Markree	−0·7	−0·7	−0·2	−0.1 Kew Stand.	−0.6	min. — ther.
Edgeworthstown	−0·5	−0·3	−0·3	+0·6	—	
Dublin	−0·3	−0·4	−1·1	−0·3 Grass Min.	−0·3	
Kilkenny Castle	—	—	0·0	−0·2	—	
Waterford	−0·7	−0·8	+0·1	+0.2	—	
Killarney	−0·2	−0·2	−0·1	+0.2	—	
Foynes	−0·7	—	−0·5	+0·3	—	
Llandovery	—	—	−1·5	0.0	—	

Report of Inspection of the Scottish Stations for 1889.

Barometers.

The inspector's mercurial Standard Barometer No. 690 was used on this year's inspection tour. The results of the inspection of the station barometers are given in the following table. The barometers were found to be in good order, and continue to be observed with the same care and accuracy as in former years.

Stations.	Inspector's Standard corrected.	Not corrected.		Remarks.
		Rep. Barometer.	Check Barometer.	
	Inches.	Inches.	Inches.	
Fort William -	29·680	29·680	—	
Fort Augustus -	29·945	29·943	—	
Glencarron -	29·237	29·237	—	
Stornoway -	29·908	29·904	29·901	
Swanbister -	29·678	29·688	—	
Dunrossness -	29·560	29·554	29·558	
Wick - -	29·186	29·180	29·142*	* Read 15 min. later in house at higher level.
Nairn - -	29·560	29·558	29·559	
Aberdeeen -	29·715	29·715	29 712	
Braemar - -	28·891	28·878	—	
Dundee - -	29·734	29·730	—	
Ardrossan -	30·026	30·020	—	
Pinmore - -	29·986	29·992	—	
Glenlee - -	29·736	29·748	—	
Leith - -	29·264	29·260	—	
Marchmont -	29·118	29·118	—	
Ochtertyre -	29·415	29·424	—	

Thermometers.

The thermometers in use at the stations were compared in water with Standard Thermometer No. 4433. The following table gives the corrected readings of the Standard Thermometer and the errors of each instrument as determined by the comparisons.

Stations.	Standar No. 4433, corrected.	Dry Bulb.	Wet Bulb.	Spare Thermometer.	Max. Thermometer.	Min. Thermometer.	Time in Water, in Minutes.	Change of Temperature.	Remarks.
	°	°	°	°	°	°			
Fort William -	57·8	0·0	+0·2	—	+0·2	−0·1	40	Uniform.	
Fort Augustus -	58·3	+0·1	+0·1	—	0·0	−0·4	60	Do.	
Glencarron -	57·1	0·0	−0·1	—	0·0	−0·2	90	Do.	
Stornoway -	57·6	+0·5	+0·6	+0·4	−0·2	−0·4	150	Do.	About 0°·2 of min. ther. at top of tube. Put right.
Swanbister -	59·1	+0·1	+0·1	+0·8	−0·2	−0·4	90	+0·2	
Dunrossness -	59·2	+0·4	+0·4	—	+0·2	−0·9	200	+0·2	
Wick - -	58·6	+0·4	+0·4	—	−0·3	−0·4	70	Uniform.	
Lairg - -	57·0	+0·2	+0·2	—	−0·2	0·0	60	Do.	
Nairn - -	55·8	+0·7	+0·7	+0·1	0·0	+0·9	80	+0·3	In reading 1°·0 is subtracted from min.
Aberdeen -	56·3	+0·2	+0·1	—	0·0	+0·1	90	Uniform.	
Braemar - -	55·3	+0·5	+0·4	—	0·0	−0·1	70	Do.	
Dundee - -	58·7	+0·5	+0·5	—	+1·3	−0·3	90	+0·4	
Ardrossan -	51·5	+0·2	+0·3	—	−0·2	−0·2	120	Uniform.	
Pinmore -	50·6	+0·2	+0·4	—	−0·1	+0·1	90	+0·2	
Glenlee - -	51·5	+0·2	+0·2	—	−0·3	0·0	140	Uniform.	
Leith - -	50·0	+0·1	+0·4	—	+0·1	−0·6	50	Do.	
Marchmont -	51·0	−0·2	−0·2	—	0·0	0·0	225	+0·5	
Ochtertyre -	49·9	0·0	0·0	—	+0·6	0·0	130	Uniform.	

As requested by the Office, the minimum thermometers were very specially examined, and only at Stornoway was this instrument found out of order. The quantity which was lodged in the top of the tube directly under the clamp was only 0°·2. This was rectified in presence of the observer, who was at the same time instructed how to put it right if it should in future get out of order.

Neither the maximum nor minimum thermometer at Dunrossness is etched on the stem. As regards the minimum thermometer, the fiducial points 32°, 62°, and 92° are only very slightly above the corresponding points of the attached scale, certainly not more than two-tenths. The large error of this thermometer, about a degree, is therefore due to a faulty construction, or to some change in the mass of the fluid, or internal capacity of the tube since its graduation. Both this station and Nairn should be supplied with new minimum thermometers. At Nairn the practice has been to subtract a degree from each reading of the minimum thermometer, whereas at Dunrossness, where the error is equally great, the readings are telegraphed as made.

Hygrometers.

Again on this inspection, the dry and wet bulbs were read instantly on opening the thermometer screens, and in all cases the arrangements for correct hygrometric observations were satisfactory.

NOTES of the STATIONS.

Fort William, August 6th, 1889.—The instruments were all in good order and observed correctly and with care.

This is the low-level station at which observations have been made five times daily by Mr. Livingston since the opening of the Ben Nevis Observatory in 1883.

The building of the low-level observatory was in progress, and it was expected that it would be finished about the end of October. A delay of from three to four weeks has been occasioned by the drought of last summer by which the stones brought from Elgin could not be conveyed through the Caledonian Canal, but had to be taken round Cape Wrath to Fort William.

Fort Augustus, August 7th.—The instruments were in excellent order and observed with great care and intelligence. The one or two omissions of observations, which recently occurred, were occasioned by the new official duties of Father Martin. In future all the observations will be taken by the new observer, Father Cody. A new sunshine recorder has been erected in an excellent position.

Glencarron, August 9th.—Everything, including the Richard thermograph and barograph, were in excellent order, and well read and attended to. A new sunshine recorder has been erected, constructed for the latitude, and with the usual three stages. The house of Glencarron shelters the instrument from the sun before setting behind the hills about midwinter; and during the summer months the sun sets behind the hills about 6 p.m.; but the exact times will be observed in the course of the year.

Stornoway, August 12th.—As the clamp of the minimum thermometer is just over the top of the tube, any evaporated spirit lodged here cannot be seen. A gas flame was applied to it and the result showed that two-tenths had been evaporated. All the other instruments were in good order, and very well observed.

A misunderstanding on the part of Mr. Forbes had seriously limited the number of cases of variations of pressure inserted in his daily telegraph reports. He now quite understands what is wanted and how to handle the aneroidogram, so that his daily report will show the more marked changes of pressure, and the non-instrumental phenomena of storms, for which the help of his assistants and others will be enlisted

Swanbister, August 14th.—The instruments were all in the best order, and very accurately observed.

Dunrossness, August 17th–19th.—Everything was in excellent order, and the observations are made with great care and accuracy. Neither the maximum nor the minimum thermometer has its stem engraved. As regards the minimum, which reads nearly a degree too low, the three fiducial scratches on the stem are each about $0^{\circ}\cdot 2$ above these readings; the instrument has therefore been in error from the beginning.

Wick, August 20th.—The instruments were in very good order, and the observations taken by both observers with accuracy and despatch. The rain-gauge had been recently repaired and is now in good order.

Lairg, August 21st.—The instruments were removed in May from their old positions to the house and garden of the new observer, Mr. Young, of the public schools. The new positions are very good. A new rain-gauge and supports for the thermometer screen are required, which will shortly be supplied, otherwise the instruments were in good order and are well observed. The height of the new station is 335 feet.

Nairn, August 22nd.—The instruments were in excellent order, and the observations well taken by all the observers.

Aberdeen, August 24th.—All the instruments were in very good order and are well observed. Mr. Boswell has been in the habit, as surmised by Mr. Gaster, of tapping the aneroidograph, but in future this will not be continued.

Braemar, August 27th.—The instruments are well kept and observed. Since, however, they have been in use for the long period of 33 years, it is desirable that some changes and repairs be made, which are now being attended to.

Dundee, August 28th.—The instruments continue to be thoroughly well kept, and the observations carefully and correctly made.

Ardrossan, September 30th.—The Stevenson screen required pretty extensive repairs and repainting, which were ordered to be done. The rain-gauge has been repaired, but is not quite firmly fixed this was to be done on the following day. Otherwise the instruments were in good order, and very intelligently observed. On the two days when the wet bulb was found to be dry, the cup of the hygrometer had been upset. The observer was told what to do should this recur. As Mr. Mayes is now settled in Ardrossan, satisfactory arrangements will shortly be made for making the 10 p.m. observation. The new assistant read the instruments correctly, and made up the telegram also correctly.

Pinmore, October 1st.—The instruments were all in excellent order, and are very carefully observed. As explained in previous reports, this station is situated in a rather deep valley, only from 150 to 300 yards in breadth, and virtually shut in on all sides. The instruments are in an open position in the garden, but all round there is much fine old wood. Thus the prevalent calms are a striking feature of this limited district, as also are the rapid fall of temperature in the early evening and the rather frequent frosts.

Glenlee, October 2nd.—The instruments were in particularly good order, and are observed with much care and intelligence.

Leith, October 10th.—The supports of the thermometer screen and the enclosure for the instruments require to be repaired and repainted, and orders were given to have this done. Otherwise the instruments were in very good order, and the observations are made with much care and intelligence.

Marchmont, October 11th–12th.—All the instruments were in particularly good order, and the observations are made with intelligence and accuracy. The following additional instruments are at this station:—Maximum and minimum black bulbs; a minimum thermometer suspended outside the thermometer screen; three underground thermometers; a second rain-gauge, 12 inches square, with its rim 15 inches high; a glycerine sunshine recorder, designed by Mr. Loney, and an aneroidograph.

Ochtertyre, October 17th.—All the instruments were in singularly good order, and observed with great care and intelligence. The following additional instruments are at this station:—A complete set of duplicates of thermometers and rain-gauge; three underground thermometers at depths of 3, 12, and 22 inches; maximum and minimum exposed thermometers.

(Signed) ALEXANDER BUCHAN.

Read—Reports on fishery barometer inspections by Captain Toynbee (Letter 1272), and by Mr. Ley (Letter 1296), of which the following is an abstract:—

ABSTRACT of REPORT of INSPECTION of FISHERY BAROMETER STATIONS.

Station.	Situation.	Condition.	Remarks.
	REV. W. C. LEY.		
PORT ST. MARY	In charge of harbour-master	Not stated.	—
PEEL	On the pier	Do.	Case of cistern much coated with rust.
	CAPT. H. TOYNBEE.		
DONEGAL	Outside watch-house at Ball Hill	Good	Fishermen ask for removal of barometer to post office. No record kept.
KILLYBEGS	In coastguard watch-room	Good	Boat-house more convenient for barometer.
TRIBANE	Inside watch-house	Good	No record kept.
TEELIN	In window of boat-house	Fairly good. Verniers defective.	Do.
PORTNOO	In porch of watch-house	New	Record will be kept.
BURTON PORT	Near the door of Mrs. Keown's house.	Fairly good. Thermometer broken.	Proposed to remove barometer to post office.
KINCASLAGH	In porch of Mr. J. O'Donnell's house.	Good	Will be placed on pillar outside. Record kept.
BUNBEG	Outside late residence of Divisional Officer.	Fairly good. Vernier broken	Readings recorded. Barometer will probably be moved.
DUNDALK	In entrance of Town Hall	Good.	—
GREENORE	Inside boat-house	Fairly good. Verniers defective.	Not recorded nor regularly set.
CARLINGFORD	In wall of boat-house	Good	No record kept.
ARDGLASS	Inside boat-house	Good	Do.
MARYPORT	Outside Custom House	Good	Record kept.
MORECAMBE	In wall of hotel in King's Arms Crescent.	Good.	—
FLEETWOOD	In window of harbour watch-house	Good	Record kept.
BALLYGLASS, BROADHAVEN.	In coastguard watch-house	Good.	—
BALLYCASTLE, Co. MAYO.	Do. do.	Good.	—
HOWTH	On wall of lifeboat shed	Good	National Lifeboat record kept.
MALAHIDE	At door of coastguard boat-house	Good.	—
HAKIN, MILFORD	In sailors' reading room	Good	Diagram kept
ANGLE, MILFORD HAVEN.	Attached to a figure head of a ship outside a shop.	Reads correctly, but instrument has suffered from exposure to weather.	—

Submitted—The following reports on the 8.30 p.m. forecasts for the months of July, August, and September, 1889 :—

The letters used have the following signification :—

a=complete success. | c=partial failure.
b=partial (*i.e.* more than half) success. | d=total failure.

JULY.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success. a + b.
Scotland, N.	a	58	52	55	
,,	b	23	32	28	83
,,	c	13	13	13	
,,	d	6	3	4	
Scotland, E.	a	42	68	55	
,,	b	39	16	28	83
,,	c	16	13	14	
,,	d	3	3	3	
England, N.E.	a	52	55	54	
,,	b	36	19	27	81
,,	c	6	16	11	
,,	d	6	10	8	
England, E.	a	55	55	55	
,,	b	29	29	29	84
,,	c	16	16	16	
,,	d	0	0	0	
Midland Counties	a	61	55	58	
,,	b	26	26	26	84
,,	c	13	13	13	
,,	d	0	6	3	
England, S.	a	58	68	63	
,,	b	32	20	26	89
,,	c	7	6	7	
,,	d	3	6	4	
Scotland, W.	a	61	39	50	
,,	b	23	32	28	78
,,	c	10	13	11	
,,	d	6	16	11	
England, N.W.	a	65	42	54	
,,	b	19	26	22	76
,,	c	10	29	20	
,,	d	6	3	4	
England, S.W.	a	52	36	44	
,,	b	23	45	34	78
,,	c	19	13	16	
,,	d	6	6	6	
Ireland, N.	a	55	42	49	
,,	b	29	29	29	78
,,	c	13	19	16	
,,	d	3	10	6	
Ireland, S.	a	49	45	47	
,,	b	35	29	32	79
,,	c	10	20	15	
,,	d	6	6	6	
Summary.					
British Isles	a	55	51	53	
,,	b	29	27	28	81
,,	c	12	16	14	
,,	d	4	6	5	

AUGUST.

The letters used have the following signification :—
a=complete success.
b=partial (*i.e.*, more than half) success.
c=partial failure.
d=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success. a + b.
Scotland, N.	a	48	45	47	79
,,	b	29	36	32	
,,	c	13	16	15	
,,	d	10	3	6	
Scotland, E.	a	39	52	46	81
,,	b	39	32	35	
,,	c	9	13	11	
,,	d	13	3	8	
England, N.E.	a	42	49	46	88
,,	b	45	39	42	
,,	c	7	6	6	
,,	d	6	6	6	
England, E.	a	58	39	49	86
,,	b	29	45	37	
,,	c	7	10	8	
,,	d	6	6	6	
Midland Counties	a	55	55	55	88
,,	b	29	36	33	
,,	c	13	6	9	
,,	d	3	3	3	
England, S.	a	68	52	60	96
,,	b	32	39	36	
,,	c	0	6	3	
,,	d	0	3	1	
Scotland, W.	a	45	61	53	86
,,	b	36	29	33	
,,	c	13	0	6	
,,	d	6	10	8	
England, N.W.	a	49	55	52	86
,,	b	32	35	34	
,,	c	13	0	6	
,,	d	6	10	8	
England, S.W.	a	65	58	62	86
,,	b	23	26	24	
,,	c	3	13	8	
,,	d	9	3	6	
Ireland, N.	a	32	58	45	82
,,	b	42	32	37	
,,	c	10	7	9	
,,	d	16	3	9	
Ireland, S.	a	35	52	44	81
,,	b	42	32	37	
,,	c	13	13	13	
,,	d	10	3	6	
Summary.					
British Isles	a	49	52	51	85
,,	b	34	35	34	
,,	c	9	8	9	
,,	d	8	5	6	

The letters used have the following signification :—

a=complete success.
b=partial (*i.e.*, more than half) success.
c=partial failure.
d=total failure.

SEPTEMBER.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success. a + b.
Scotland, N.	a	57	60	59	86
,,	b	30	24	27	
,,	c	7	3	5	
,,	d	6	13	9	
Scotland, E.	a	50	64	57	85
,,	b	33	23	28	
,,	c	10	7	9	
,,	d	7	6	6	
England, N.E.	a	64	53	59	87
,,	b	30	27	28	
,,	c	3	10	7	
,,	d	3	10	6	
England, E.	a	70	57	64	94
,,	b	23	37	30	
,,	c	7	3	5	
,,	d	0	3	1	
Midland Counties	a	53	57	55	87
,,	b	30	33	32	
,,	c	17	7	12	
,,	d	0	3	1	
England, S.	a	43	63	53	90
,,	b	47	27	37	
,,	c	7	10	9	
,,	d	3	0	1	
Scotland, W.	a	40	44	42	71
,,	b	27	30	29	
,,	c	20	13	16	
,,	d	13	13	13	
England, N.W.	a	47	47	47	74
,,	b	33	20	27	
,,	c	7	20	13	
,,	d	13	13	13	
England, S.W.	a	50	47	49	84
,,	b	30	40	35	
,,	c	10	7	8	
,,	d	10	6	8	
Ireland, N.	a	47	40	44	74
,,	b	20	40	30	
,,	c	20	7	13	
,,	d	13	13	13	
Ireland, S.	a	47	33	40	70
,,	b	23	37	30	
,,	c	17	10	14	
,,	d	13	20	16	
Summary.					
British Isles	a	52	51	52	82
,,	b	30	31	30	
,,	c	11	9	10	
,,	d	7	9	8	

Submitted—The following Statement respecting the Records from July to December 1888, received from the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 1876, 3rd January 1883, and 6th March 1889) :—

July to December 1888.	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	Fair.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient:—										
Due to stoppage of clock	0	0	13 hrs.	14 hrs.	0	0	0	0	0	0
„ other causes	1 hr.	18 hrs.	0	0	2 hrs.	2 hrs.	5 hrs.	5 hrs.	8 hrs.	10 hrs.
Number of errors discovered:—										
By general examination	0	0	9	19	15	25	9	3	19	7
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0
Mean difference irrespective of sign	0·1	0·4	0·1	0·3	0·1	0·4	0·1	0·3	0·1	0·3
Residual difference (—Meteorological Office)	0·0	+0·1	−0·1	+0·1	0·0	0·0	+0·1	+0·1	0·0	+0·1
Orientation verified	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—
RAIN GAUGE:—										
Action of Instrument	Good.		Good.		Indifferent.		Good.		Good.	
Records deficient:—										
Due to stoppage of clock	0		0		0		0		0	
„ other causes	0		1 hr.		0		2 hrs.		48 hrs.	
Number of errors discovered:—										
By general examination	4		7		22		26		20	

——	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH:—				
Action of Instrument	Good.	Good.	Good.	Good to Indifferent.
Character of Photography	Do.	Do.	Do.	Fair.
Records deficient:—				
Due to stoppage of clock	0	0	5 hrs.	1 hr.
„ failure of light	0	1 hr.	0	4 hrs.
„ other causes	5 hrs.	60 hrs.	6 hrs.	9 hrs.
Number of errors discovered:—				
In entry of standards	6	18	7	1
„ calculating residuals	2	4	1	3
„ applying „	4	14	2	9
By general examination	3	46	12	25
Results of 40 Remeasurements:—				
Greatest difference	·006	·007	·011	·007
Mean difference irrespective of sign	·002	·002	·002	·002
Residual difference (—Meteorological Office)	·000	·000	·000	·000
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·001	·002	·002	·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Good to Indifferent.	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	16 hrs.	16 hrs.	0	0
„ failure of light	0	0	0	0	0	0	6 hrs.	0
„ imperfectly moistened bulbs	—	0	—	0	—	15 hrs.	—	10 hrs.
„ partially frozen bulbs	—	19 hrs.	—	0	—	48 hrs.	—	5 hrs.
„ other causes	16 hrs.	11 hrs.	9 hrs.	9 hrs.	6 hrs.	7 hrs.	13 hrs.	14 hrs.
Number of errors discovered:—								
In entry of standards	0	2	6	5	1	3	0	3
„ maxima and minima	13	—	19	—	5	—	13	—
By general examination	12	10	15	21	16	10	26	19
Results of 40 Remeasurements:—								
Greatest difference	0·2	0·2	0·3	0·2	0·2	0·4	0·4	0·8
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	0·0	0·0	0·0	−0·1	−0·1	0·0	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·2	0·2	0·2	0·1	0·1	0·2	0·2	0·2

Aberdeen.

Rain-gauge.—The attachment of the curves was somewhat unsatisfactory during December.

Barograph.—A second edge, or penumbra, affected the definition of the lower edge of trace throughout the period under notice; apparently it was caused by imperfect focussing, as it is not noticeable above 29·8 ins., but below that point it increases with the decrease of pressure. On September 6th the glass pendant carrying the pointer was broken by Mr. Whipple; several attempts were made to remedy the defect, and finally on October 1st everything was again in position; in the meantime the residuals were large and fluctuating.

Thermograph.—The curves are disfigured by secondary images, and a failure of the traces (especially that of the dry-bulb) on several occasions; the latter was caused as follows:—"On the "upright shields on either side of the stem being replaced after the tube had been re-blackened "during the last inspection one of them had not been placed quite vertical, consequently the "slit at the bottom was narrowed, and part of the light was obstructed." (See M.O. 325, 1889.) The instruments were examined and cleaned by Mr. Whipple on September 4th.

Armagh.

Anemograph.—The velocity traces were intermittent at low rates, owing to a slight mechanical defect. The velocities recorded are very much lower than at the other observatories.

Rain-gauge.—Traces sometimes very faint, and the attachment of the papers unsatisfactory.

Falmouth.

Rain-gauge.—Trace irregular and action of instrument generally unsatisfactory. By note on curve 208 the pencil stated to have "dropped immediately after being set"; it is questionable as to how often this occurred and as to its influence on the large differences between the Beckley and the check gauges. A Stonyhurst "lifter" was fitted to the Beckley gauge on October 16th, and improvement resulted, but trace was still unsteady.

Barograph.—The definition of the traces not so good subsequent to the examination; and on December 26th and 27th the cylinder showed an inclination to stick, causing loss of records. The residual corrections are at times large and very fluctuating; attention has frequently been drawn to the subject, but neither the superintendent of the observatory or the inspector at the annual examinations have been able to discover the cause.

Thermograph.—The curves are disfigured by secondary images.

The instruments were examined and cleaned by Mr. Baker on October 15th–19th.

Kew.

Anemograph.—The action of the pricker somewhat imperfect and frequently not shown; attachment of papers not always satisfactory.

Rain-gauge.—The rain discharger failed to act in September.

Barograph.—Penumbra to lower edge of trace and definition not good toward the latter part of the period. The regulation of the clocks used for working the different cylinders is very unsatisfactory, and the clocks are stated by the superintendent to be much the worse for wear. The instruments were examined and cleaned on 23rd August.

Valencia.

Anemograph.—The tracings on some of the curves are occasionally very faint, caused by the "rain driven in through the roof" damping the papers.

Rain-gauge.—The attachment of papers very bad at times and traces faint. A Stonyhurst "lifter" fitted to the Beckley gauge on October 8th, but during December the pencil caught and action was imperfect.

Barograph.—A second edge to lower part of trace developed in August. During October there are several indications of slight interference with the instrument. The results of the inspection were not satisfactory to the definition of the lower edge of traces.

Thermograph.—Curves disfigured by secondary images and clock regulation not always satisfactory. The instruments were examined and cleaned by Mr. Baker on October 8th.

General.

Internal evidence is occasionally forthcoming showing that the rules are not adhered to at some of the observatories; the subsidiary sheets are useful in detecting such cases.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful) - - - -	= 63
C (failures) - - - -	= 31

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

FREDC. GASTER.

Telegraphic Branch,
23rd October 1889.

Submitted—The following statement of accounts for the half year ending 30th September 1889 :—

Income.	£ s. d.	£ s. d.
Balance from year 1888–89	- -	2,777 7 10
Proportion of vote -	- -	7,650 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	5 5 0	
(2.) Special researches -	1 13 4	
		6 18 4
Supply of Weather Information :		
D.W. Charts and Forecasts - -	122 13 2	
6 p.m. Charts -	12 10 0	
Information for Press Agencies, &c. -	47 15 2	
Telegrams - -	121 6 6	
		304 4 10
Sale of Instruments, &c. :		
Royal Navy account -	2 19 7	
Mercantile Marine account - -	8 10 4	
		11 9 11
Commission charged on work done for Colonies, &c. - -	- -	10 0 11
		£10,760 1 10

Expenditure.	£ s. d.	£ s. d.
Administration :		
Payment of Council -	500 0 0	
Secretary - -	400 0 0	
Salaries and wages -	408 5 2	
Rent, fuel, and lighting -	313 3 4	
Furniture and fittings -	*32 11 9	
Incidental and contingent expenses -	153 4 9	
Expenses incidental to International Meteorological Congress	5 2 0	
Pensions - - -	93 8 2	
		1,935 15 2
Special Researches -	- - -	*291 0 1
Land Meteorology :		
Observatories and stations - -	987 13 11	
Discussion and reduction of observations -	734 16 0	
		1,722 9 11
Weather Information and Forecasts :		
Telegraphic reports and storm warnings -	1,126 1 3	
Preparation and issue of reports and forecasts - -	893 2 8	
		2,019 3 11
Inspections :		
Salaries and travelling -	- - -	*292 7 4
Ocean Meteorology :		
Discussion and reduction of observations -	793 18 0	
Expenses incidental to the supply of instruments :		
Proportion for care and issue of instruments -	100 0 0	
Royal Navy -	303 15 1	
Mercantile Marine -	190 19 2	
Distant island and coast stations -	2 10 0	
		1,391 2 3
Balance - - -	- - -	3,108 3 2
		£10,760 1 10

Liabilities.	£ s. d.
To Council - - - -	500 0 0
„ contracts or work uncompleted -	177 11 9
„ Post Office (estimated) - -	148 0 0
„ sundry creditors - - -	501 1 3
„ balance - - - -	3,108 3 2
	£4,434 16 2

Assets.	£ s. d.
By cash at Bank - - - -	3,480 10 8
„ „ at Office - - - -	74 16 8
„ sundry debtors - - -	229 8 10
„ H.M. Exchequer - - -	650 0 0
	£4,434 16 2

* Some expenses under these heads not yet brought to account.

Read—A memorandum from Mr. Baillie, stating that since last meeting 41 logs had been received, 35 of them being "excellent."

Charts had been presented to—

Capt. J. D. Spooner.
Comr. T. F. Pullen, R.N.
Dr. G. D. Trevor-Roper, R.N.
Capt. W. B. Drenning.
Capt. H. Sibery.
Capt. J. Thearle.
Capt. J. E. Thompson.
Lieut. H. Thompson, R.N.
Capt. G. W. Atkinson.
Capt. J. Pope.

Mr. Scott reported that two very old observers had recently ceased sending in logs, Capt. James Clarke, who had kept 21 logs between September 1855 and September 1888, and Capt. C. W. Pearson, who had kept 30 logs, marked "excellent," between September 1871 and October 1889.

Mr. Scott was authorised to present a barometer to each of these gentlemen as a recognition of their very long connexion with the Office.

Reported—That Capt. Fowler, the agent for the Office at Cardiff, had resigned the post in July, and that Mr. Baillie recommended the appointment of Mr. A. M. Ferguson, of Penarth, as agent for Cardiff, provided the inquiries he was instituting about that gentleman were satisfactory.—Approved.

Mr. Scott reported that he had received a letter (M.O. 1670) from the Furness Railway Company, stating that that Company, which had maintained the station since March 1880 at its own expense, had decided to discontinue the reports. Mr. Scott was instructed to express the regret of the Council at the cessation of these reports. (P.C. 1985.)

Read—A letter (No. 1429) from Mr. Berridge, the reporter at Loughborough, asking for an allowance of 6*d.* per week for porterage for his telegrams.—Granted.

Reported—That weather telegrams had been sent to the A Fleet during the recent manœuvres, at the request of the Hydrographer.

Submitted—The following list of publications which had been received since the last meeting:—

Hill, S. A.—On temperature and humidity observations made at Allahabad at various heights above the ground.

Hamburg, Deutsche Seewarte.—Tägliche synoptische Wetterkarten für den Nordatlantischen Ozean und die anliegenden Theile der Kontinente. 3 and 4 Quart., June to November, 1885.

—— Vierteljahrs-Wetter-Rundschau an der Hand der täglichen synoptischen Wetterkarten für den Nordatlantischen Ozean. Herbst 1884. Winter 1884-5. Frühling, 1885. Bd. i., Heft. 5. Bd. ii., Heft. 1-2.

Symons, G. J.—British rainfall, 1888.

Toronto Observatory.—Toronto general meteorological register for 1888.

Cracow, C. K. Akademii.—Materyjaly do klimatografii Galicyi. 1888.

Aitken, J.—On improvements in the apparatus for counting the dust particles in the atmosphere. Parts i. and ii.

Berlin, Hydrographisches Amt.—Allgemeine Inhalts-Uebersicht und ausführliches Sach- und Namen-Register der Jahrgänge 1873–1888 der Annalen der Hydrographie und maritimen Meteorologie.

—— *K. Preussisches meteorologisches Institut.*—Ergebnisse der meteorologische Beobachtungen in Jahre 1887.

Pouchet, G.—Expériences sur les courants de l'Atlantique Nord.

Carlsruhe, Centralbureau für Meteorologie und Hydrographie.—Die Ergebnisse der meteorologischen Beobachtungen im Jahre 1888.

Cape of Good Hope, Meteorological Commission.—Report for 1888.

Sundell, A. F.—Åskvädren i Finland, 1888.

Paulsen, A.—Contribution à notre connaissance de l'aurore boréale.

Ragona, D.—Pressione atmosferica bi-oraria del 1888 e considerazioni sulle proprietà delle formule periodiche relative all' andamento diurno del barometro e sulle ore tropiche dei mesi invernali.

Utrecht, Kon. Nederlandsch meteor. Instituut.—Jaarboek, 1879, II. 1888.

—— Waarnemingen van Onweders in Nederland. 1882–88.

Prague, K. Böhm. Gesellschaft der Wissenschaften.—Ombrometrische Beobachtungen. 1879–1882.
—— Resultate der ombrometrischen Beobachtungen. 1879–1883.
—— Abhandlungen. vii. Folge. Bd. 1–2.
Studnicka, F. J.—Grundzüge einer Hyëtographie des Königreiches Böhmen.
Copenhagen, Institut Météorologique.—Expédition Danoise. Observations faites à Godthaab. Tome ii. iie. Livr.
Monaco Prince Albert De.—Campagnes scientifiques de S.A.S. Le Prince Albert de Monaco faites sur son yacht L'Hirondelle en 1885, 1886, 1887, et 1888. Chart.
Washington, Smithsonian Institution.—Annual report. 1886. Part i.
Lisbon, Observatorio do Infante D. Luiz.—Annaes. 1885, 1886.
—— Observações dos postos meteorologicos. 1885.
Gratz, naturwissenschaftlicher Verein für Steiermark.—Mittheilungen. 1888.
Weber, L.—Mittheilungen, betreffend die im Auftrage des elektrotechnischen Vereins ausgeführten Untersuchungen über atmosphärische Elektrizität. Dritter Bericht.
Singapore, Principal Civil Medical Officer.—Meteorological report. 1888.
Greenland.—Observations météorologiques et nautiques faites à Nennortalik et à Angmagsalik par les membres de l'expédition de M. le Capitaine G. Holm pour explorer la côte est du Groenland. 1883–85.
Blodget, L.—Climatology of Pennsylvania.
Tokio, Meteorological central observatory.—Annual meteorological report. 1886, Parts i. and ii. 1887, Part i.
—— Report of the meteorological observations in the Empire of Japan. 1884, 1885.
London, Board of Trade.—Abstracts of the returns of shipping casualties from July 1887 to June 1888.
Calcutta, Meteorological Office.—Meteorological observations recorded at seven stations in India in the year 1888.
Adelaide Observatory.—Rainfall in South Australia and the Northern Territory during 1888.
Weber, L.—Ueber Blitzphotographien.
Madrid, Observatorio.—Resumen de las observaciones meteorológicas efectuadas en la Peninsula y algunas de sus islas adyacentes. 1884, 1885.
—— Observaciones meteorológicas efectuadas en el Observatorio de Madrid. 1886, 1887.
Kammermann, A.—Résumé météorologique de l'année 1888 pour Genève et le Grand Saint-Bernard.
London, Army Medical Department.—Annual abstract of meteorological observations taken at Netley and foreign stations in the year 1887.
Tebbutt, J.—Report of Mr. Tebbutt's observatory, Windsor, N.S.W., for the year 1888.
Philadelphia, American Philosophical Society.—Subject register of papers published in the Transactions and Proceedings.
Hoppe, H.—Ergebnisse der meteorologischen Beobachtungen im Königreich Sachsen, 1888.
Calcutta, Meteorological Office.—Administration report of the meteorological reporter to the Government of Bengal for the year 1888–89.
Hart, J. H.—Annual report on the Royal Botanic Gardens, Trinidad, and their work for the year 1888.
Natal Harbour Board.—Chairman's minute and departmental reports for the year 1888.
Hamburg, Deutsche Seewarte.—Aus dem Archiv der Deutschen Seewarte. 1888.
Schreiber, P.—Die Theilnahme Sachsens an den meteorologischen Forschungen.
Colladon, D.—Sur la durée de l'éclair.
Stewart, C. H.—Note on the carbonic acid and micro-organisms in the air at various stations during the cruise of H.M.S. "Jackal."
Gibson, J.—Report on observations relating to the physics and chemistry of the North Sea during 1888 and 1889.
Prague, K.K. Sternwarte.—Magnetische und meteorologische Beobachtungen. 1888.
Marseilles, Commission météorologique du département des Bouches-du-Rhone. Bulletin annuel. 1887.
Utrecht, koninklijk nederlandsch metorologisch Instituut.—Waarnemingen in den Indischen Oceaan over de maanden December, Januari en Februari.
Kiel, Kommission zur wissenschaftlichen Untersuchung der deutschen Meere.—Sechster Bericht für die Jahre 1887 bis 1889. 1 Heft.
—— Atlas deutscher Meeresalgen. 1 Heft.
Rotch, A. L.—Observations made at the Blue Hill meteorological observatory, Mass., U.S.A., in the year 1888.
Egeson, C.—Rainfall map of New South Wales, May 1–June 11, 1889.
—— The daily area of rainfall in New South Wales for April to June, 1889.
—— Climatological charts of Australia for July, 1889.
—— Miscellaneous newspaper articles on meteorology.
Hamburg, Deutsche Seewarte.—Ergebnisse der meteorologischen Beobachtungen im Systeme der Deutschen Seewarte für die Lustren 1876–1880 und 1881–1885 sowie das Dezennium 1876–1885.
Coimbra, Observatorio.—Observações meteorologicas 1888.
Hann, J.—Zur Meteorologie des Sonnblickgipfels.
Trinidad, Botanical Department.—Island rainfall, 1868–1888.

Müttrich, A.—Jahresbericht über die Beobachtungs-Ergebnisse der von . . . forstlich-meteorologischen Stationen. 1888.

Rajna, M.—Confronti e verificazioni d'azimut assoluti in Milano.

Colombo, Surveyor General's Office.—Report on the meteorology of Ceylon for 1888.

Volante, G.—Osservazioni meteorologiche fatte in Alessandria alla Specola del Seminario. 1887, 1888.

Hong-Kong, Surveyor General's Office.—Report on great storm of 29th and 30th May, 1889.

México, Observatorio meteorológico-magnético central.—Resúmen comparativo correspondiente á los años de 1877–1888.

Manchester Literary and Philosophical Society.—Memoirs and proceedings. 4th series, vol. ii.

Woeikof, A.—Der Einfluss einer Schneedecke auf Boden, Klima und Wetter.

Hill, S. A.—The tornadoes and hailstorms of April and May, 1888, in the Doab and Rohilkhand.

Nipher, F. E.—Report on Missouri rainfall, with averages for ten years ending December, 1887.

Margate, Medical Officer of Health.—Report. 1888.

Woeikof, A.—Voyage aux salines d'Iletzk et au pays voisin.

Hann, J.—Beiträge zur arktischen Meteorologie.

Hildebrandsson, H.—Rapport sur la classification des nuages.

Helsingfors, Finska Vetenskaps-Societet.—Öfversigt af Finska Vetenskaps-Societetens Förhandlingar. 1887–88.

Contarino, F.—Sulle registrazioni del pluviografo Richard negli anni 1886 e 1887.

—— Sulle acque sotterranee della Città di Napoli.

Lahore, Sanitary Commissioner.—Report. 1888.

Reported—That 25 aneroids had been ordered on the Admiralty account, to meet demands for the manœuvres. Cost 62*l.*—Approved.

Mr. Scott reported (Minutes, 1888, pp. 79 and 91) that the mean monthly hourly results for barometrical pressure and air temperature had been calculated for the years 1883 and 1882.

Inasmuch as the barometrical results for the year 1881 and for certain previous years had been already calculated, it was not necessary for these years that more than the air temperature should be dealt with. Mr. Scott therefore suggested that for this work the allowance should be 5*s.* per station per three months, being four-ninths of the charge, 11*s.* 3*d.*, previously allowed for both elements.—Approved.

63, *Victoria Street, November* 6, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. GALTON. | MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (October 23) were read and confirmed.

Mr. Scott reported (Minutes, p. 9), that no further information had been received from Dr. Meldrum to complete his cyclone track charts for the Indian Ocean. Charts were submitted, drawn under Mr. Baillie's directions, for all the months exhibiting cyclones, and stated that in June and July very few were recorded and none at all in August or September.

It was resolved that these charts be published, nine in number, the information for June and July being placed on one chart. It was further resolved to print Dr. Meldrum's original charts, showing the tracks for each year, and bind them with the monthly charts.

Mr. Scott submitted the following memorandum as to existing stations in Pacific Islands (Letter 726/89) :—

MEMORANDUM

As to stations in Pacific, following the order of list forwarded by Hydrographer, 16th April 1889.

1. *Fiji.*—No action taken. Observations made regularly by Mr. Vaughan and Mr. Holmes. Sheets received regularly at M.O.
2. *Noumea.*—No observations taken. (Letter 854, from Paris.)
3. *Tahiti.*—No observations taken. (Letter 854, from Paris.)
4. *New Guinea.*—Letter 1494. Observations will be taken if instruments are supplied.
5. *New Hebrides.*—Letter 1486. Observations were taken at Futuna, 1867–76, by Rev. J. Copeland; they are printed, and in Meteorological Office. Nothing apparently going on at present.
6. *Malden Island.*—Grice, Sumner, & Co. (Letter 1325). MS. observations sent in. They request supply of instruments, and meanwhile have obtained some on loan from Mr. Ellery.
7. *Tonga.*—Observations regularly made and published. (Letter 1583.) Apparently this publication *began* with October 1888. Have written to ask if this is the case.

No replies as yet received from either the London, or the Melanesian Mission Society, as to other islands given by Hydrographer.

(Signed) ROBERT H. SCOTT.

Mr. Scott was instructed to ask Professor Mascart if observations could not be instituted in New Caledonia and in the Society Isles, and to supply instruments to New Guinea and to Malden Island.

Read—A memorandum from Mr. Baillie stating that since last meeting ten logs had been received, seven of them being "excellent."

Mr. Scott was instructed to express the thanks of the Council to the observers, and to present Captain De Horne, S.S. "Rohilla," with a copy of the charts (O. 27).

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

(1.) WARNINGS ISSUED.

Summary.

A + B (successful) - - - -	= 19
C (failures) - - - - -	= 11

(2.) GALES EXPERIENCED BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
6th November 1889.

Submitted—The following report on the 8.30 p.m. forecasts for October 1889:—

The letters used have the following signification:—

a=complete success. | **c**=partial failure.
b=partial (*i.e.* more than half) success. | **d**=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	55	45	50	78
,,	b	13	42	28	
,,	c	16	7	11	
,,	d	16	6	11	
Scotland, E.	a	45	65	55	86
,,	b	42	19	31	
,,	c	7	13	10	
,,	d	6	3	4	
England, N.E.	a	39	55	47	83
,,	b	52	19	36	
,,	c	9	23	16	
,,	d	0	3	1	
England, E.	a	29	39	34	78
,,	b	52	35	44	
,,	c	6	16	11	
,,	d	13	10	11	
Midland Counties	a	23	45	34	66
,, ,,	b	45	19	32	
,, ,,	c	23	26	25	
,, ,,	d	9	10	9	
England, S.	a	29	65	47	83
,,	b	52	19	36	
,,	c	13	13	13	
,,	d	6	3	4	
Scotland, W.	a	36	39	38	63
,,	b	19	32	25	
,,	c	29	19	24	
,,	d	16	10	13	
England, N.W.	a	42	68	55	78
,,	b	32	13	23	
,,	c	23	10	16	
,,	d	3	9	6	
England, S.W.	a	32	64	48	82
,,	b	45	23	34	
,,	c	10	10	10	
,,	d	13	3	8	
Ireland, N.	a	42	55	49	85
,,	b	36	36	36	
,,	c	16	6	11	
,,	d	6	3	4	
Ireland, S.	a	26	52	39	80
,,	b	49	32	41	
,,	c	19	3	11	
,,	d	6	13	9	
Summary.					
British Isles	a	36	54	45	78
,,	b	40	26	33	
,,	c	16	13	15	
,,	d	8	7	7	

Submitted—The following statements of work during the four months ended October 31:—

MARINE BRANCH.

November 5, 1889.

Examined 60 new logs and 5 lighthouse registers.

Received from the lithographer proofs of 16 Aden cyclone charts, May and June 1885. The same examined, and 10 passed for press and 6 for revise.

Outline chart of the Red Sea and Gulf of Aden drawn and lithographed, for plotting the results of the discussion of the data, the extraction of which is completed to M.O. log 7473, down to March of the present year. The mean results from wind and instrumental observations are well advanced, and the charting of the information has been commenced.

Annual mean pressure and range charts prepared, lithographed, and passed for press as a supplement to Official Publication No. 76.

Preparing and charting currents in all oceans.

Copying observations contained in rough books into logs Nos. 6060, 7608, 7609, and 7610.

Obtaining information as to the character of the weather in the months of November, December, and January between Halifax and Bermuda, over a period of fifteen years, in connexion with the proposal to lay a telegraph cable between the two places.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council,

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

Monthly Weather Summary:—

1888. *March* and *April*.—Published.
Tables, &c. for other months are complete (as before reported).

1889. *April*.—Published.
May.—Sent to press.
June to *September*.—Tables, &c. prepared up to date.

(As was anticipated, nothing was done during the vacation by way of writing the text and publishing these reports. They are, however, now in hand again, and can be handed in at about the rate of one month's Summary per week.)

Weekly Weather Report.—All numbers have been issued promptly to date. Appendix I. has been issued promptly, and other appendices are all but up to date.

Steps have been taken in order to improve the report generally, and to reduce the cost. These have been successful.

Daily Weather Report.—Issued promptly to date. Monthly correction and addition sheet for *September* has been issued.

[Owing to change of Government lithographer, referred to in Minute, p. 27, some delay was experienced in getting the July numbers out. Even now it seems impossible to post the earlier impressions quite as early as they used to be formerly, but steps are being taken to surmount the difficulty. The form, maps, &c. have been carefully re-drawn.]

Primary Checking of Storm Warnings.—Done to date, and reports handed in.

Investigation as to Prevalence of Fog.—Is now being proceeded with again.

Hay Harvest Forecasts.—Issued promptly. Checking of same has been commenced.

Checking of Daily Forecasts.—Done to date. Summaries for July, August, and September have been already handed in; that for October to be handed in to-morrow.

Nearly the whole of the annual holidays have now been taken.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

Observatory Returns.—Proof of Part IV. "Hourly Readings," 1886, finally revised, and the part published. The calculation of the mean values for 1887 is well advanced, and has been carried as far as is advisable until the Council decide to what extent the publications are to be modified.

Quarterly Weather Report.—The chart plates for Part II., 1880, are completed, but have not yet been sent to printer. Part I., 1880, has been published.

Harmonic Analyser.—The calculation of the coefficients of temperature for five-day periods for the 12 years 1871–82 has been completed, and the results are meaned and tabulated. The analysis of the barograms for 1881 has been resumed.

Miscellaneous.—A good deal of time has been spent upon plans for the revision of "Hourly Readings," as also on cloud measurements, sunshine station inspection notes, and the usual routine work of the room. The Bunhill Row sunshine cards to end of September have been tabulated, and the results forwarded to the Royal Meteorological Society. The means required for the Kew Annual Report are now being calculated. The usual summer vacation has been taken in the period covered by this report.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

Examinations.

July 1888 to January 1889.—Completed.

April to September 1889.—Kew *Barograms* and *Thermograms* completed for that Annual Report.

March 1889.—Barograms and Thermograms for all observatories completed.

June to September 1889.—Partial examination of the Valencia work for the Registrar-General of Ireland.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

June 1888 to January 1889.—"Notes of Errors" to all observatories, and monthly reports thereon.

January to December 1888.—Reports on the work for these months to Council.

March to September 1889.—"Notes of Errors" in connexion with the new barograms and thermograms.

Miscellaneous.

Preparing and copying notes of instructions for the annual inspections.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting :—

Jamaica.—Meteorological observations. Vol. i. 1881–88.

Stuttgart, Meteorologisches Centralstation.—Deutsches meteorologisches Jahrbuch. 1888.

Calcutta, Surveyor General.—General report on the operations of the Survey of India Department. 1887–88.

Mauritius Observatory.—Meteorological results. 1887, 1888.

Hong-Kong Observatory.— Observations. 1888.

Wollny, E.—Zur Frage der Brauchbarkeit der Thaupunktmethode zur Vorausbestimmung der Nachtfröste.

Schönrock, A.—Zusammenfassung der Resultate wiederholter Vergleichungen der Normalbarometer in Europa.

Rome, R. Ufficio Centrale di Meteorologia.—Annali. Vol. vii. 1885. Parts 1–3. Vol. viii. 1886. Parts 1 and 4.

Reported—That S. Bristow had resigned his situation October 12th.

Mr. Scott proposed that W. H. Parsons should be moved to the Examination Room; that C. Pycock should undertake the printing of forecasts, and receive 1*s.* per week additional from November 18th; and that Charles Goad be engaged, at 12*s.* per week, from the same date.—Approved.

63, *Victoria Street, November* 20, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 6) were read and confirmed.

Submitted—The following correspondence, which was approved :—

(M.O. 1977.)

Board of Trade (Marine Department),
London, S.W., November 11, 1889.

SIGNALS.

SIR,

I AM directed by the Board of Trade to request that you will be good enough to lay the following circumstances before the Council of the Meteorological Office for their consideration.

A Maritime Conference (to which Her Majesty's Government have sent delegates) is now sitting at Washington. It was at first arranged that the British delegates should not proceed beyond a discussion of (1) the Regulations for preventing Collisions at Sea; and (2) the draft to which vessels should be loaded.

Her Majesty's Government have, however, now decided to join in the discussion of other matters, among which the following are included :—

Warnings of approaching storms—

(*a.*) The transmission of warnings;

(*b.*) The uniformity of the signals employed.

Under these circumstances, Lord Salisbury and Sir Michael Hicks-Beach are desirous of sending to Washington at once an additional delegate competent to take part in the discussion on these points; and I am to request that you will ask the Council of the Meteorological Office to favour the Board of Trade with their observations in the matter, and to suggest the name of a gentleman they think suitable for the duty in question.

I am, &c.
(Signed) HENRY G. CALCRAFT.

The Secretary,
Meteorological Office,
116, Victoria Street, S.W.

(M.O. 1977.)

November 13, 1889.

I HAVE to acknowledge the receipt of your letter of the 11th instant, addressed to the Secretary of the Meteorological Council, relative to a proposal to send to the Maritime Conference now sitting at Washington a delegate qualified to take part in a discussion on storm warnings, which subject is amongst those to be brought before the Conference.

Understanding it to be important that no time should be lost in dealing with this matter, I think it better to inform you at once of the conclusions I have come to, after discussion with the Secretary to the Council, rather than wait to bring it before the full Council, which would necessarily involve a delay of some days. I feel satisfied, however, that the opinions I shall express would be confirmed by the Council.

I cannot think that any practical advantage would be derived from sending a delegate to Washington for the purpose in question. The subject of storm warnings and of forecasting weather, on which the issue of such warnings depends, has been constantly before the Meteorological Office from its first formation, and the Council has been in frequent and intimate communication with the Meteorological Office at Washington as well as with the corresponding departments of the chief States of Europe on the subject, and it regularly interchanges telegraphic information with these last for the purposes of weather forecasting. For more than two years the Council received from Washington daily telegrams designed to convey from the other side of the Atlantic information obtained there, and considered to be likely to be useful in the forecasting of weather in the British Isles. A very prolonged and patient discussion of the data thus procured has satisfied the Council and I may add all the staff employed in the preparation of forecasts, which is composed of very intelligent persons having very prolonged experience in this branch of duty, that no advantage whatever could at present be derived from communications received from the coasts of America. The Council have therefore for nearly a year ceased to participate in this special telegraphic service, and there seems to be no prospect of the character of the available information being so modified as to justify its renewal.

Doubtless great advantage may be obtained by improving and extending the transmission of information along the coasts of the continent of America from and to suitable stations, and there is every reason to think that the Meteorological Offices of the United States and the Dominion of Canada fully appreciate this, and act in concert in giving effect to it.

But the preparation of weather forecasts and the issue of warnings as to expected storms must in the very nature of the subject be dealt with locally, and it is very questionable whether any useful purpose would be gained by the adoption of uniformity of methods, otherwise than so far as the general progress of scientific knowledge indicates the direction of possible improvement; and this, it is hardly necessary to say, is more likely to be secured by looking favourably on independent working, rather than the reverse.

Even in such a matter as that of weather signals it also seems doubtful whether the attempt to introduce uniformity would be successful or useful. Such signals are virtually made for the use of the shipping or fishing vessels in the harbours or proposing to leave them, and so long as their significance is clearly understood by the local population, they may be held to have performed the function expected of them.

Finally, I may observe that there is no one whom the Council is likely to name, should the deputation of a delegate be resolved on, except their Secretary, Mr. R. H. Scott, who, no doubt, possesses all the necessary qualifications. But such a mission would be entirely outside the duties of his office, and he could hardly be expected to undertake it without special remuneration.

(Signed) R. STRACHEY,
Chairman of the Meteorological Council.

The Assistant Secretary,
Marine Department,
Board of Trade.

Read—Letter 1961 from the Stationery Office stating that the plan proposed by the Council (Minutes, p. 37) had been approved by the Controller.

With reference to the observations asked for from the Royal and Scottish Meteorological Societies (Minutes, p. 31), Mr. Scott read Letters M.O. 1799 and 1919 agreeing to supply the information.

He proposed the following scale of payment:—

	£	s.	d.
For observations in detail with means, Form A., per monthly sheet	0	10	0
For monthly and annual results, Form B., per yearly sheet	3	0	0
Weekly Weather Reports, per weekly sheet	0	1	0

The total cost of the information would be—

For the Royal Meteorological Society.

	£	s.	d.
Form A., 5 stations	30	0	0
„ B., 12 „	36	0	0
Weekly Weather Reports, 10 stations	26	0	0
	£92	0	0

For the Scottish Meteorological Society.

	£	s.	d.
Form A., 4 stations	24	0	0
„ B., 16 „	48	0	0
Weekly Weather Reports, 7 stations	18	4	0
	£90	4	0

This Office to pay postages in both cases, and any future additions or reductions to be allowed for at the above rates.

The proposal was approved, and Mr Scott was instructed to write to the two Societies accordingly. (P.C. 2210 and 2216.)

The subject of the Hourly Readings was then discussed, and Mr. Scott submitted a memorandum (Letter 2039) from Mr. R. Curtis, detailing certain schemes of publication which he had drawn out under the Chairman's directions.

The scheme provided for the discontinuance of the publication of the actual Hourly Readings, and the substitution for them of certain Mean Values as detailed in the following schedule :—

(A.) *Five-day tables* giving for five-day groups—

A_1.	Hourly and daily means of pressure - - -	8 pages.
A_2.	,, ,, air temperature - -	8 ,,
A_3.	,, ,, difference dry and wet bulbs	8 ,,
A_4.	,, ,, wind components (probably)	16 ,,
A_5.	,, ,, number of hours of rain, with hourly and five-day totals - - -	8 ,,

(B.) *Daily tables* giving for each day—

1.	Mean pressure and extreme readings - - -	12 ,,
2.	Air temperature ,, ,, - - -	
3.	,, difference dry and wet - - - -	
4.	Total rainfall and mean hourly fall in month - -	

(C.) *Monthly tables* giving for each month and also for the year—

1.	Monthly and daily means of pressure - - -	4 ,,
2.	,, ,, air temperature - -	
3.	,, ,, difference dry and wet -	
4.	,, ,, wind components - -	4 ,,
5.	Hourly, monthly, and yearly totals of rainfall - -	
		68 pages.

In addition to the above there will be room in the Table C. for monthly *resultants* of wind, if required.

Read—A memorandum from Mr. Baillie stating that since last meeting nine logs had been received, seven of them being "excellent." Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Submitted—The following reports :—

REPORT on INSPECTIONS of the SELF-RECORDING OBSERVATORIES and ANEMOGRAPH STATIONS of the METEOROLOGICAL COUNCIL, 1889.

The Valencia Observatory was visited from July 29th to August 2nd. The instruments were all inspected and found in good order, the clocks of the barograph and thermograph being cleaned and the light shutters re-adjusted. The anemograph required painting externally, which would be done after inspection, and the direction shaft inside the observatory was loose at some of the joints. It was tightened up, and new pins put in to make it fast. A slight want of repair in the thermograph screen was pointed out to Mr. Cullum.

The mercury in the Beckley gauge was taken out, cleaned, and replaced, with the addition of a quantity of fresh metal to supply a certain amount which had been lost.

The usual comparisons of the thermograph thermometers with the observer's standard, K.O. 682, were made with the following results :—

Dry, No. 399, correction at 60°	-	-	-	$-0^\circ \cdot 6$
Wet, ,, 398, ,,	-	-	-	$-0 \cdot 5$
Max., ,, 1003, ,,	-	-	-	$0 \cdot 0$
Min., ,, 2497, ,,	-	-	-	$-0 \cdot 2$

The usual official form of report was filled in, and is submitted with this.

The Armagh Observatory was visited from August 5th to August 7th. In the absence of Dr. Dreyer, the director, I was received by the Rev. E. Faris, who was in charge.

The anemograph was found to be much choked and corroded with bad oil, which has been employed for its lubrication; this, however, was removed, and the bearings cleaned. Unfortunately, the new sperm oil purchased by the Meteorological Office for the especial purpose of anemometer oiling had not arrived at the time of my visit, and I was compelled to make use again of the unsatisfactory lubricant in the absence of better.

The Beckley rain-gauge was cleaned, the mercury filtered, and the lifter re-adjusted, all being in satisfactory condition.

Falmouth Observatory, visited August 10th to 15th. On examination I found the anemograph, barograph, rain-gauge, and thermograph all in first-rate order, and merely required the usual cleaning and oiling, which operations were duly performed.

The thermometers were compared with my standard, and the corrections found to be as follows :—

Dry, No. 383, correction at 63°	-	-	-	$0^\circ \cdot 5$
Wet, ,, 388, ,,	-	-	-	$-0 \cdot 4$
Max., ,, 104, ,,	-	-	-	$-0 \cdot 5$
Min., ,, 308, ,,	-	-	-	$0 \cdot 0$

The thermometer attached to the standard barometer still requires a correction of $-0^{\circ}\cdot7$; this however, is never applied to its readings, the observers not having received official instruction to do so.

The anemograph at the Holyhead pier-head was inspected whilst a gale was blowing on July 24th, and therefore was not dismounted.

It was found to be in very good order both inside and outside, all the bearings appearing to be well oiled and quite free. The pins of the connecting shafts were, however, nearly shaken out and had to be driven home tight. I called the attention of Mr. Hugh Williams to them in order that they may be watched in case they should loosen again.

The Mountjoy anemograph, visited July 25th, was found working well and in excellent order. The vane bearing, however, has been running glycerine instead of oil, and this by absorbing water freely, causes a constant dripping of greasy matter on the curves, which produces a disfigurement.

I suggested the suspension of a small zinc cup beneath the bearing in a position to catch the drops in future.

(Signed) G. M. WHIPPLE.

(M.O. 1951.)

DEAR SIR, Kew Observatory, October 1889.

I HAVE the honour to hand you herewith my report and inspection notes regarding the self-registering instruments at the following observatories, Stonyhurst, Glasgow, and Aberdeen, and also the anemograph station at Fleetwood.

(Signed) T. W. BAKER.

To R. H. Scott, Esq., F.R.S.

Stonyhurst, visited September 17th–18th.—Here all the instruments were working satisfactorily. The thermograph and barograph had their clocks, lenses, and fittings cleaned, after which the various thermometers were compared at 55° by means of Kew Standard No. 682, and the following corrections determined :—

Dry, Standard 619	$-0^{\circ}\cdot1$
Wet, Standard 382	$-0\cdot3$
Maximum, M.O. 439	$-0\cdot3$
Minimum, M.O. 501	$+0\cdot1$

The anemometer was entirely dismounted, and although found in excellent condition the different parts were cleaned, and fresh oil applied to all the bearings. Afterwards the orientation was tested and found correct.

On examining the rain-gauge it was noticed that the discharger which has been in use for many years past is now nearly worn out, and a new one is much needed. Also new stencil plates are required for the thermograms and barograms.

Mr. Carlisle informed me that the barometer now in use for the control observations is not very satisfactory, the residual corrections varying considerably according as to whether the mercury is rising or falling.

The sunshine recorder is fixed to a stone balustrade about 4 feet above the roof of the magnetic chamber, and is properly adjusted both as regards time and level. A shadow, however, is cast upon it for a few minutes at 2 p.m. during a part of December by the finial ornament fixed on top of a summer house about 30 yards distant south-west, otherwise the exposure is good all the year round.

Glasgow, visited September 20th–21st.—According to the usual practice the thermograph and barograph clocks were cleaned as well as the other instrumental parts. Cardboard shields were fitted to the thermograph lenses in order to keep reflected light from discolouring the photographic sheets.

The zero lines were changed to the winter position, and the various thermometers compared and found to require the following corrections at 50° :—

Dry, Standard 550	$-0^{\circ}\cdot1$
Wet, Standard 472	$-0\cdot4$
Maximum, 58,846	$+0\cdot1$
Minimum, 63,942	$-0\cdot1$

The grass minimum (59003) read low by $0^{\circ}\cdot6$, but this was owing to a small quantity of spirit which had become detached from the main column and lodged in the upper portion of the tube. After putting the instrument in order the correction was found to be $+0^{\circ}\cdot1$.

The barograph thermometer requires a correction of $-0^{\circ}\cdot8$, and the attached thermometer to the standard barometer $-0^{\circ}\cdot5$.

As regards the anemometer, the instrument was completely dismounted and cleaned, and fresh oil applied to all its bearings. The clock was also examined and a new line attached.

The orientation was then tested and the sheet containing the result accompanies this report.

New lines were attached to the rain-gauge clock and the usual cleaning performed.

The sunshine recorder is very well placed on the roof of the observatory, and has a good exposure all the year round. It is also properly adjusted for time and level, but the surface of the glass sphere is somewhat corroded, though it does not appear sufficient to diffuse the light to such an extent as to blurr the solar image on the card.

Aberdeen, September 24th–27th.—The various instruments at this observatory were in very good order.

My special attention having been called to the stray light which at times was very marked on the thermograph sheets, I dismounted both the dry and wet thermograph tubes and applied several coatings of lamp black mixed with varnish to each tube, after which cardboard shields were fitted to both lenses, and subsequent curves seem to show that the light has now been effectually excluded.

Both the barograph and thermograph clocks as well as the lenses, &c. were cleaned.

The barograph mahogany case did not fit very well, having become slightly warped; this I had put right.

According to instructions the thermometers were tested in pounded ice, and the following corrections were determined at 32° :—

Dry, standard 397 - - - - -	−0°·1
Wet, „ 395 - - - - -	−0·6
Maximum, 1,002 - - - - -	0·0
Minimum, 5,056 - - - - -	0·0
Attached thermometer (to standard barometer) No. K.O. 71,061 - - - - -	−0·3
Barograph thermometer (no number) - - -	−2·0

The external portions of the anemometer were dismounted, and all parts cleaned and fresh oil applied, but the clock and recording apparatus only required oiling. Afterwards the orientation was examined and found satisfactory.

"Squeezes" were taken of both the self-registering and spare rain-gauges.

The Beckley gauge was in excellent order, as well as the clock.

Fleetwood, Oct. 1st–2nd.—On dismounting the anemograph at this station it was found that the oil in the direction bearing had become very thick and hard, but in the velocity bearing it was in a much better condition. The instrument was thoroughly overhauled, and all parts cleaned and fresh oil applied. After remounting it was oriented, and the sheet is sent with this report.

The clock was taken to pieces and cleaned and new lines attached.

(Signed) T. W. BAKER.

Read—Letter 1944, being Mr. Abercromby's Report of Inspection of the Fishery Barometers on the North-east Coast of England, of which the following is an abstract :—

ABSTRACT of the HON. R. ABERCROMBY'S REPORT of INSPECTION of FISHERY BAROMETERS on the EAST COAST.

Station.	Situation.	Condition.	Remarks.
MARGATE -	Seaman's Institute, Fort Arcade -	Good - - -	Much valued and often consulted.
DEAL - -	Lloyd's signal station - -	Do. - - -	Neither read nor recorded. Much consulted.
KINGSDOWN -	Wall of property belonging to executors of Sir J. Mellor.	Fairly good - -	Set daily, but not recorded.
DOVER (1) -	Porch of Sailors' Home - -	Do. Vernier useless	Do. do. Much consulted.
DOVER (2) -	Inside office of Mr. E. Druce -	Excellent - -	Only set occasionally, and never recorded. Only consulted by Mr. Druce.
BERWICK - -	Inside window of Customs watch-house.	Do. - - -	Set daily, but not recorded. Much consulted.
NORTH SHIELDS -	On west side of Quaymaster's office	Do. - - -	Recorded and much consulted.
SOUTH SHIELDS -	In Mercantile Marine Office -	Do. - - -	Set, but not recorded. Not much consulted.
SUNDERLAND -	Inside watch-room of Coastguard in a private room.	Do. - - -	Set daily and recorded, but never consulted by anybody.
HARTLEPOOL -	Inside window of Dockmaster's office, East Hartlepool.	Do. - - -	Set daily and much consulted, but is out of the way of fishermen.
STAITHES - -	On wall of house adjoining Coastguard boat-house.	Good - - -	Set, but not recorded. Frequently consulted.
SCARBOROUGH -	At entrance to harbour-master's office.	Very good - - -	Set daily and recorded. Much consulted.
FILEY - -	Wall of Cliff Top house, adjoining Coastguard station.	Do. - - -	Set, but not recorded. Much consulted.
FLAMBOROUGH -	Wall of house of Mr. E. Fell, tailor	Excellent - -	Do. do.
BRIDLINGTON -	Wall of harbour-master's old office on the quay.	Very good - - -	Do. do. There is also another office barometer in office of Coastguard.
BRIGHTLINGSEA -	Front of the "Anchor" Inn -	Out of order.	——

Mr. Scott reported that he had been requested by Mr. Thiselton Dyer (Letter 2004) to test the accuracy of certain charts prepared by Herr Nowack from his so-called "Weather Plant" now being examined at Kew Gardens. Mr. Scott was authorised to test a few of the statements.

Reported—That no storm warnings had been issued and no gales reported since last meeting.

Submitted—The following list of publications which had been received since the last meeting:—

Bombay, Government Observatory.—Report on the condition and proceedings of the Government Observatory, Colába, for the year ending 30th June 1889.

Wild, H., et Backlund, O.—Rapport fait à l'académie impériale dês sciences par les délégués de la Russie à la conférence générale du mètre, réunie à Paris en Septembre 1889.

Trieste, Osservatorio Marittimo.—Rapporto annuale . . . per l'anno 1886 redatto da F. Osnaghi.

Russell, H. C.—Results of rain, river, and evaporation observations made in New South Wales, during 1888.

—— Results of meteorological observations made in New South Wales during 1887.

—— Proposed method of recording variations in the direction of the vertical.

—— The storm of 21st September 1888.

—— On a new self-recording thermometer.

—— The thunderstorm of 26th October 1888.

—— The source of the underground water in the Western districts.

—— President's address at the first meeting of the Australasian Association for the advancement of science.

—— Astronomical and meteorological workers in New South Wales, 1778 to 1860.

Washington, Signal Office.—Annual Report for 1889. (Advance copy.)

Hobart Royal Society of Tasmania.—Papers and proceedings for 1888.

Mohn, H.—Die tägliche Periode der Feuchtigkeit in Christiania.

—— The physical conditions of Barents Sea.

Birkner, O.—Die wissenschaftlichen Erhebungen zur Wasserkatastrophe in der sächsischen Oberlausitz am 18 Mai 1887.

Schuster, —.—Observations météorologiques faites à Metz pendant l'année 1885.

Paris, Bureau Central Météorologique.—Rapport du comité météorologique international. Réunion de Zurich, 1888.

Denza, F.—I terremoti di novembre e di dicembre 1887 in Italia.

—— I primi cultori italiani dell' aeronautica.

—— Le valanghe degli inverni 1885 e 1888.

—— La inclinazione magnetica a Torino e nei dintorni.

Paris, Comité International des Poids et Mesures.—Procès-verbaux des séances de 1888.

63, *Victoria Street, December* 4, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 20) were read and confirmed.

Read—Letter 2044 from Mr. H. W. Yorke, of Jersey, suggesting that a small allowance be made to the men who take charge of the sunshine recorder, recently entrusted to the care of the Harbour-Master, St. Helier's.—Declined (P.C. 2305).

Read—A letter from Mr. Baillie, reporting that since last meeting three logs had been received, all of them being "excellent."

Mr. Scott was instructed to express the thanks of the Council to the observers.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands, since the last meeting of the Council:—

1. WARNINGS ISSUED.

A + B (successful)	= 2
C (failures)	= 0

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

There was a strong S.Wly. gale experienced in the English Channel on the night of November 24–25, caused by a depression which at 6 p.m. 24th, lay over central Ireland. The information available at 6 p.m. 24th did not show the depression, but only a rather deep "V"-shaped system, secondary to the large and general low-pressure area in the far N. Had I had any notion that such a system had been developed in the "V," I would certainly have warned the coasts visited by the gale.

(Signed) FREDC. GASTER.

Meteorological Office
4th December 1889.

Submitted—The following statements of work during November 1889:—

MARINE BRANCH.

December 3rd, 1889.

Examined 19 new logs.

Proofs of six Aden cyclone charts, June 1885, received. Ten charts examined, five passed for press and five for revise.

Discussion of Red Sea data. Charting current observations and mean wind results, and obtaining the means of instrumental data.

Preparing and charting currents in all oceans.

Data recently received added to the charts for the neighbourhood of Cape Guardafui.

Information received from Mr. Meldrum added to the charts of cyclone tracks in the South Indian Ocean.

Copying Hydrographical remarks from log No. 7719 for the Admiralty.

Indexing data in ocean 10-degree squares.

Two outline charts of Europe drawn, for the Daily and Weekly Weather Reports respectively.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

Telegraphic (Storm Warning and Forecast) Branch.

(To 30th November 1889.)

Weekly Weather Report, 1889.—All numbers issued to date.

Monthly Summaries:—

May.—Issued.

June.—Signed "for press." Copies expected 4th December.

July.—Ready for printer.

August.—Half ready for printer.

September and *October*.—Tables ready and some maps drawn.

Daily Weather Report, 1889.—Issued promptly. Correction sheet for October issued. Steps are being taken to have the maps, both for the Weekly and Daily Reports, redrawn.

Primary Checking of Storm Warnings, 1889.—Done to date.

Checking of Daily Forecasts.—Done to end of November.

Checking of Hay Harvest Forecasts, 1889.—Done. Summary not quite ready.

Preparation of Returns for prevalence of Fog and Mist.—In each month for years 1876–79, at Liverpool, Holyhead, Pembroke, Scilly, Plymouth, and Hurst Castle; completed and handed in.

Examination of Herr Nowack's maps, and comparison of same with our own maps; making reduced copies of maps for three days, &c.—Completed.

Preparation of Foreign and British Reports, Maps, &c. for binding (about 50 vols.).—Done.

Preparation of Table showing Kew Corrections for Thermometers now at Telegraphic Reporting Stations.—All but done. (Omitted from October Report of work done.)

Quarterly Weather Report, 1880.—Tables showing mean values at Telegraphic Reporting Stations, April to June 1880.—Completed.

(Signed) Fredc. Gaster.

Telegraphic Branch,
4th December 1889.

Pantagraph Room.

November 30th, 1889.

Observatory Returns.—The copying of the "Hourly Readings" 1887, for four months, in five-day groups, for the calculation of the series of means required for new form of publication which has been decided upon for the observatory records, has been finished, and the calculation of the means begun.

Harmonic Analyser.—The analysis of the barograms for 1881 has been completed, and the curves for two observatories for 1882 passed through the investment.

Miscellaneous.—The various means necessary for compiling the table printed in the Kew Observatory Annual Report for 1888–89 have been calculated, and the table prepared and sent to Kew. The preparation of forms, and other matters connected with the new series of "*Hourly Readings*," has occupied a good deal of time; and a smaller amount of time has also been taken up with matters which have arisen from the calculation of hourly means for pressure and temperature now in progress.

(Signed) R. H. Curtis.

R. H. Scott, Esq., F.R.S.

Examination Branch.

December 2nd, 1889.

Examinations.

March and *April* 1889.—Completed.

May 1889.—Thermograms and barograms.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

March 1889.—"*Notes of Errors*" to all observatories.

Miscellaneous.

Preparing "Diary of Operations" for 1890, and correcting proof of same.

Revising forms 32, 32A, and 43 for printer. Examining and posting inspectors' reports. Investigations re [illegible]uth bar-graph residual. The staff was one clerk short until the 21st ultimo, when Mr. Parso[illegible] ined; since that date my time has been greatly occupied in instructing him.

(Signed) T. E. Allen.

Submitted—The following report on the 8.30 p.m. forecasts for November 1889 :—

The letters used have the following signification :—

a=complete success. | **c**=partial failure.
b=partial (*i.e.* more than half) success. | **d**=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success. a + b.
Scotland, N.	a	64	37	51	82
,,	b	23	40	31	
,,	c	10	3	7	
,,	d	3	20	11	
Scotland, E.	a	57	43	50	80
,,	b	23	37	30	
,,	c	20	10	15	
,,	d	0	10	5	
England, N.E.	a	63	43	53	85
,,	b	20	43	32	
,,	c	17	7	12	
,,	d	0	7	3	
England, E.	a	63	37	50	88
,,	b	27	53	38	
,,	c	7	7	7	
,,	d	7	3	5	
Midland Counties	a	63	37	50	87
,,	b	23	50	37	
,,	c	7	3	5	
,,	d	7	10	8	
England, S.	a	60	40	50	92
,,	b	30	53	42	
,,	c	7	7	7	
,,	d	3	0	1	
Scotland, W.	a	47	27	37	79
,,	b	37	47	42	
,,	c	3	13	8	
,,	d	13	13	13	
England, N.W.	a	43	30	37	82
,,	b	37	53	45	
,,	c	13	7	10	
,,	d	7	10	8	
England, S.W.	a	62	38	50	85
,,	b	21	48	35	
,,	c	10	7	8	
,,	d	7	7	7	
Ireland, N.	a	40	50	45	
,,	b	30	30	30	
,,	c	20	7	14	
,,	d	10	13	11	
Ireland, S.	a	37	50	44	82
,,	b	40	37	38	
,,	c	10	7	9	
,,	d	13	6	9	

Summary.

British Isles	a	55	39	47	84
,,	b	28	45	37	
,,	c	11	7	9	
,,	d	6	9	7	

Submitted—The following memoranda :—

MATERIALS for preparing ESTIMATES for 1890–91.

	Data for framing Estimates.	Estimated Expenditure for 1890–91.	Proposed for for 1890–91.	Voted for 1889–90.
Administration :	£	£	£	£
(1.) Council	-	1,000	1,000	1,000
(2.) Secretary	-	800	800	800
(3.) Salaries :*	-	800	780	810
Chief Clerk	333			
1 Junior Clerk	195			
2 unclassified clerks	104			
Office Keeper	109			
Messenger	57			
	798			
Deduct for present salaries of unclassified clerks and messenger £23				
Less increment to junior clerk 5				
	18			
	780			
(4.) Rent, fuel, and lighting*	-	720	720	720
Rent	635			
Fuel	59			
Gas	21			
	715			
(5.) Incidental and contingent expenses*	-	430	420	500
Office Keeper's contingent account, including porter's allowance for cleaning, &c.	194			
Postage	64			
Furniture and Office repairs	96			
Carriage of parcels, &c.	21			
Stationery Office : Annual Reports and sale of forms	14			
Copying synchronous observations	9			
Books	20			
Sundries (including International Meteorology)	42			
	460			
Deduct repayments under this head, including "Commission"	32			
	428			
(6.) Pensions	-	187	190	190
(1.) Capt. H. Toynbee	144			
(2.) Mr. J. S. Harding, senr.	43			
*Special Researches and Experiments**	-	1,000	1,000	1,000
Instruments, &c.	10			
Bridled anemometer (Holyhead)	12			
Cloud experiments	14			
Sunshine cards, &c.	34			
Electrical anemometer	74			
Discussing R.E. and other observations	45			
Dines's anemometer experiments	43			
Sundries	9			
	241			
*Salaries :**				
Harmonic analysis (Mr. Sheerman)	135			
Female staff	210			
	586			
Add for present salaries and increments authorised	46			
	632			
Transfer from Discussion of Land Meteorology, § 2	250			
	882			
The amount under this head is, as usual, put at 1,000*l.*, without regard to expenditure.				
Carried forward	-	4,937	4,910	5,020

* Payments for one year ending 31st March 1889.

	Data for framing Estimates.	Estimated Expenditure for 1890–91.	Proposed for 1890–91.	Voted for 1889–90.
	£	£	£	£
Brought forward	- -	4,937	4,910	5,020
Land Meteorology:				
(1.) Observatories and stations (Allowances, &c.)*	- -	2,250	2,250	1,970
Aberdeen	282			
Armagh	50			
Ben Nevis	100			
Falmouth	250			
Fort William	250			
Glasgow	75			
Kew	400			
Stonyhurst	55			
Valencia (including rent)	535			
Anemograph stations	61			
Meteorological Societies (Observations II. Order)	103			
Instruments	55			
Sundries	8			
	2,224			
Additional charge on observations from Stations II. Order	35			
	2,259			
(2.) Salaries*:—Discussion and reduction of observations	- -	1,260	1,250	1,350
2 Senior Clerks	500			
6 Junior Clerks	740			
3 Unclassified Clerks	89			
	1,329			
Add for present salaries and increments authorised	86			
„ 2 *Supernumerary* clerks (engaged for temporary work, Minutes, 1889, pp. 1 and 9)	99			
	1,514			
Deduct sum to be charged against Special Researches	250			
	1,264			
Weather Information and Forecasts	- -	2,080	2,080	2,200
(1.) Telegraphic reports and storm warnings:*				
Reports from inland stations	591			
Reports from abroad	123			
Reports sent abroad	519			
Storm warnings	286			
Hay harvest forecasts	32			
Private wires	108			
Payments to reporters, &c.	641			
Reports to Jersey	34			
Sundry telegrams, forecasts, &c.	32			
Postage of charts and incidental expenses	226			
Instruments, screens, &c.	64			
Synoptic charts (Foreign)	37			
Wrappers, printing, &c.	24			
U.S. reports	22			
Sundries	5			
	2,744			
W. W. Reports	44			
	2,788			
Deduct:—				
Repayments during the same period £683				
U. S. Reports 22				
	705			
	2,083			
Carried forward	- -	10,527	10,490	10,540

* Payments for one year ending 31st March 1889.

	Data for framing Estimates.	Estimated Expenditure for 1890–91.	Proposed for 1890–91.	Proposed for 1889–90.
	£	£	£	£
Brought forward	- -	10,527	10,490	10,540
(2.) *Salaries:—Preparation and issue of reports and forecasts	- -	1,800	1,800	1,700
1 Senior Clerk (9 hours daily)	309			
7 Junior Clerks (5 work 9 hours daily)	1,005			
2 Unclassified Clerks	98			
1 Messenger	65			
Addition for late evening and Sunday attendance	205			
	1,682			
Add for present salaries and increments authorised	117			
	1,799			
*Inspections**	- -	550	550	550
Mr. Abercromby	13			
„ Baker	23			
„ Buchan	34			
„ „ (salary)	150			
„ Curtis	3			
„ Ley (30*l.* not yet accounted for)	63			
„ Gaster	6			
Royal Meteorological Society	25			
Mr. Scott	62			
Scottish Meteorological Society and Mr. Dickson	107			
Captain Toynbee	102			
Mr. Whipple	43			
	631			
No salary paid to Mr. Ley in this year; probable extra charge in 1890–91	50			
	681			
Deduct special payments to Mr. Abercromby and Scottish Meteorological Society	120			
	561			
Ocean Meteorology:				
(1.) *Salaries:—Discussion and reduction of observations	- -	1,600	1,590	1,590
Marine Superintendent and assistant do.	458			
1 Senior Clerk (in charge of instruments)	333			
1 „ „ („ Marine Rooms)	275			
5 Junior Clerks	730			
2 Unclassified Clerks	81			
	1,877			
Deduct for present salaries, including increments authorised	74			
	1,803			
Deduct proportion nominally chargeable to care and issue of instruments (say)	200			
	1,603			
(2.) Salaries:—Proportion chargeable to care and issue of instruments	- -	200	200	200
(3.) Supply of instruments to the Royal Navy*	- -	(*a*) 335	330	350
Instruments, repairs, &c.	336			
Verifications	57			
	393			
(4.) Supply of instruments, &c. to Mercantile Marine*	- -	(*a*) 324	320	350
Instruments, repairs, &c.	161			
Verifications	22			
Agents' fees, &c.	189			
Packing cases	13			
Presentation labels	5			
[Receipts during the same period under heads (3) and (4), 33*l.*]	390			
(*a*) There is not much regularity about charges for instruments. The estimated expenditure under the preceding heads is taken as the mean of two years ending 31st March 1889.				
(5.) Distant island or coast stations*	31	20	20	20
There are no regular payments under this head. The charges in the first column were mostly for Heligoland				
Totals £	- -	15,356	15,300	15,300

* Payments for one year ending 31st March 1889.

Synopsis of Office Salaries and Pensions.

Service.	1890-91.	1889-90.	1890-91. Increase.	1890-91. Decrease.
	£	£	£	£
Administration	1,580	1,601	—	21
Special Researches	641	369	272	—
Land Meteorology	1,264	1,317	—	53
Weather Information	1,799	1,698	101	—
Ocean Meteorology	1,803	1,783	20	—
Pensions	187	187	—	—
Totals £	7,274	6,955	393	74

In the above statement the payment of 1,000*l.* to the Council is not included. The amounts stated are the actual salaries authorised for the respective years, so far as at present known, with the addition of an approximate amount for late evening and Sunday attendance.

It will seen that the total estimated expenditure slightly exceeds the Vote, but there is actually a reserve of about 120*l.* under Special Researches.

Meteorological Office. Estimates for the Year 1889-90.

Heads of Service.	Proposed for 1890-91.		Voted for 1889-90.		1890-91. Increase.	1890-91. Decrease.
Administration:	£	£	£	£	£	£
Payment of Council	1,000		1,000			
Secretary	800		800			
Salaries and wages	780		810			
Rent, fuel, and lighting	720		720			
Incidental and contingent expenses	420		500			
Pensions	190		190			
		3,910		4,020	—	110
Special Researches and Experiments	—	1,000	—	1,000		
Land Meteorology:						
Observatories and stations	2,250		1,970			
Salaries:—Discussion and reduction of observations	1,250		1,350			
		3,500		3,320	180	—
Weather Information and Forecasts:						
Telegraphic reports and storm warnings	2,080		2,200			
Salaries:—Preparation and issue of reports and forecasts	1,800		1,700			
		3,880		3,900	—	20
Inspections:						
Salaries and travelling expenses	—	550	—	550	—	—
Ocean Meteorology:						
Salaries:—Discussion and reduction of observations	1,590		1,590			
Expenses incidental to the supply of instruments:						
Care and issue of instruments	200		200			
Royal Navy	330		350			
Mercantile Marine	320		350			
Distant island (and coast) stations	20		20			
		2,460		2,510	—	50
Totals £	—	15,300	—	15,300	180	180

[R. S.]

The estimates were approved, and the Secretary was instructed to forward a copy to the Treasury (P.C. 2339).

Resolved—That the usual bonus of 3*l.* 3*s.* 0*d.* be given to those of the telegraphic reporters who have discharged their duties satisfactorily during the year. (Minutes, 1888, p. 84.)

Submitted—The following list of publications which had been received since the last meeting :—

Mexico, Ministerio de Fomento.—Anales. Tomo viii.
Copenhagen, Dansk meteorologisk Institut.—Meteorologisk Aarbog. 1886, i.–iii. 1887, i.–iii. 1888, i.–iii.
Mohn, H.—Windstärke und Windgeschwindigkeit auf norwegischen Leuchtfeuer-Stationen.
Tebbutt, J.—On the high tides of June 15–17, 1889.
Ekholm, N.—Sur la chaleur latente de vaporisation de l'eau et la chaleur spécifique de l'eau liquide.
Azambuja, G. A. de.—Annuario da Provincia do Rio Grande do Sul para o anno de 1890.
Findlay, A. G.—Sailing directory for the Indian Archipelago and China. 3rd edition.

63, *Victoria Street, December* 18, 1889.

PRESENT :

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 4) were read and confirmed.

Mr. Scott drew the attention of the Council to the fact that the period fixed for the continuance of the sea-surface temperature observations on the coast by the letter from the Admiralty Superintendent of Naval Reserves (Minutes, 1884, p. 86) would expire on the 31st instant, and he was instructed to request that the observations be continued. (P.C. 2392.)

Mr. Scott stated, with reference to the charge of 34*l.* for costs of "Reports to Jersey" in the materials for estimates (Minutes, p. 65), that ever since June 1863 a daily telegram had been sent to Jersey, at first *viâ* Paris, and recently by direct wire. It was posted up at St. Helier's. He was instructed to inform the Secretary, Chamber of Commerce, St. Helier's, that the Council could not continue the gratuitous transmission of these telegrams after December 31st. (P.C. 2399.)

Mr. Scott drew the attention of the Council to the MSS. deposited at the Office in 1880 by the widow of Mr. J. Allan Broun, F.R.S. (Minutes, 1880, p. 81). He was instructed to draft a letter to the Secretary of the Royal Society on the subject, and submit it at next meeting.

Submitted—Letter from Mr. Baillie stating that since last meeting four logs had been received, all of which were excellent. Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful) - - - -	=14
C (unsuccessful) - - - -	=13

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
December 18, 1889.

Reported—That the cash accounts for the six months ended the 30th September 1889 had been audited by the Chairman and Mr. Galton, and sent to the Treasury for the Audit Office. The receipts for the six months amounted to 7,418*l.* 8*s.* 5*d.* The payments amounted to 7,301*l.* 13*s.* 10*d.*, leaving a balance of 3,585*l.* 7*s.* 4*d.* in hand and at the bank on 1st October 1889, as against 3,468*l.* 12*s.* 9*d.* on the 1st April.

Read—A memorandum from Mr. R. H. Curtis asking for the assistance of a boy. (M.O. 2246). This was granted, and A. H. Rigby was appointed at a salary of 8*s.* per week.

Submitted—The following list of publications which had been received since the last meeting of the Council :—

Bucharest, Institutul Meteorologic.—Analele. Tom. iii. 1887.
Bucharest, Academia Romana.—Analele. Serie ii. Tom. x., 1887–88. 2 vols.
Hepites, St. C.—Istoricul studiilor meteorologice in Romania.
—— Instructiuni pentru compunerea telegramelor meteorologice.
—— Instructiuni relative la observatiunile asupra fenomenelor vegetatiunei si asupra animalelor pentru climatologia unei regiuni.
Hepites, St. C.—Instructiuni pentru observarea furtunelor.
—— Instructiuni pentru statiunile udometrice.
—— Instructiuni pentru statiunile termo-udometrice.
—— Organisation des stations pour l'étude de la climatologie du Royaume par régions.
—— Détermination de la hauteur du baromètre de l'institut météorologique de Bucarest.
—— Climat de Bucarest en 1885 et 1886.
—— Rapports sur les travaux de l'institut météorologique au cours des années 1886–1888.
London, Committee on Solar Physics.—Second report.
Purper, L.—Le principe du mouvement et son application à la mécanique céleste et à la météorolgie.
Ragona, D.—Vero andamento diurno della umidità relativa.
London, Registrar General.—Fifty-first annual report. 1888.
Batavia Observatory.—Rainfall in the East Indian Archipelago. 1888.
—— Observations. Vol. xi. 1888.
Abercromby, Hon. R.—On Meldrum's rules for handling ships in the hurricanes of the Southern Indian Ocean.
Rome, Ufficio Centrale Meteorologico.—Annali. Vol. viii. Parts 2 and 3. 1886.
Greenwood, W. N.—Kludonometric tide tables for the Lancashire coast and Bristol Channel. 1890.
San Fernando, Instituto y Observatorio de Marina. Anales. 1888.
Scott, R. H.—The climate of British North Borneo.
Chemnitz, K. sächsisches meteorologisches Institut.—Jahrbuch für 1887.
Brisbane, Chief Weather Bureau.—Telegraphic code and special notice to observers.
—— Meteorological instructions by C. L. Wragge.

63, *Victoria Street, January* 8, 1890.

PRESENT :

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. GALTON. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 18) were read and confirmed.

Read—The following letter :—

(M.O. 61.)

Home Office, Whitehall,
6th January 1890.

SIR,

I AM directed by the Secretary of State to transmit to you herewith a copy of the Cotton Cloth Factories Act, 1889 (52 & 53 Vict. c. 62.); and in calling your attention to section 7 of the said Act, I am to inquire whether you can inform the Secretary of State in what way "thermometers" had best be "standardized" for the purposes of the Act.

I am, &c.
(Signed) E. LEIGH PEMBERTON.

The Chairman of the Council,
Meteorological Office.

Mr. Scott was instructed to send the following reply:—

(M.O. 61.)

SIR, 11th January 1890.

IN reply to your letter B. 7680 of the 6th instant, I am instructed by the Meteorological Council to inform you that there is no difficulty in obtaining properly verified thermometers. The Kew Committee of the Royal Society verify thermometers for all instrument makers at their observatory at Richmond, to the extent of several thousands annually, and I enclose a copy of their circular on the subject.

As regards the management of the pairs of wet and dry bulb thermometers, I enclose a copy of the Instructions in the use of Meteorological Instruments, issued by this Office in which, at page 47, you will find the precautions which should be taken by the observer in order to ensure that the observations shall be reliable for the purpose of deducing the amount of moisture in the air.

I am further to say that the table in Schedule A. does not appear to be sufficient to supply a knowledge of the quantity of moisture from observations such as are contemplated, and a reference should be made to Glaisher's Hygrometric Tables, the recognized authority in this country on the subject.

I am, &c.
(Signed) ROBERT H. SCOTT.

The Assistant Under Secretary,
Home Office.

Mr. Scott submitted the following draft letter *re* the Broun MSS. (Minutes, p. 68), which was approved:—

(M.O. 625, 1881.)

SIR, 8th January 1890.

WITH reference to my letter of December 1, 1880, addressed to Professor Huxley, relative to the publication of Mr. J. Allan Broun's observations, I am instructed by the Meteorological Council to inform you that the result of their communication to Mr. Blanford, the despatch of which was intimated to the Council at the close of my letter, has been that Mr. Blanford did not see any prospect of his being able to undertake the discussion and publication of the records at the Indian Meteorological Office.

UNDER these circumstances, and as nine years have now elapsed since the date of my letter above referred to, without any useful results having been obtained in the direction desired, I am to suggest that the President and Council of the Royal Society might address Her Majesty's Secretary of State for India with the view of his proposing, for the consideration of the Government of India, that the Indian Meteorological Department, now under Mr. Eliot, might make some arrangements by which the valuable material accumulated at no inconsiderable cost and by long-continued laborious observation by Mr. Broun at Trevandrum and its vicinity may be rendered accessible to scientific men.

Not only have various meteorologists such as the late Professor Balfour Stewart, Mr. Blanford, Mr. Buchan, and Hofrath Dr. Hann of Austria, expressed their strong desire to see the work published, but the International Meteorological Congress of Rome, 1879, adopted a resolution in the same sense.

The observations are particularly valuable for many reasons, among which may be specified, first, the proximity of the station to the equator; second, that the material affords unusually ample and well-arranged data for the investigation of the vertical distribution of temperature and moisture, on the sides of the mountain on which the upper stations were situated; and third, that they will supply hourly records of the principal meteorological elements observed simultaneously at varying elevations, such as are likely to be very valuable and have very rarely been obtained in such an extended series.

The Council are satisfied that Mr. Eliot, the present Director of the Indian Meteorological Department, is very thoroughly competent to deal with the discussion of these data, and they are convinced that their publication would most suitably be carried out in connexion with the records of which a valuable and constantly increasing series has already been issued by the Indian Department, within the field of research of which the Trevandrum observations naturally fall.

I am, &c.
(Signed) ROBERT H. SCOTT.

Prof. M. Foster, M.D., &c.,
Secretary, Royal Society.

Read—A letter (M.O. 54) from Mr. Galton, proposing to place outside the Office window a board showing the state of weather and sea at various stations, the information to be changed according to the latest intelligence received.

Mr. Scott was instructed to ascertain if the landlord had any objection to the erection of such a board.

Reported—That both the Royal Meteorological Society (Letter 2119) and the Scottish Meteorological Society (Letter 2071) had accepted the terms proposed for the supply of information from their stations to the Office (Minutes, p. 56).

Read—A memorandum from Mr. Baillie, stating that seven logs had been received, six of them being "excellent." Mr. Scott was instructed to convey the thanks of the Council to the observers.

Reported—That the Admiral Superintendent of Naval Reserves had consented to carry on the sea-temperature observations for three years longer (Letter 2262). (Minutes, p. 68.)

Reported—That the Jersey reports had been stopped (Letter 2284). (Minutes, p. 68.)

Mr. Scott reported that Mr. Windeler, the electrician to the Anglo-American Company at Valencia, had rendered valuable assistance to Mr. Cullum in the recent experiments with the electric anemometer, and he was authorised to present Mr. Windeler with a honorarium of 5*l*.

Reported—That the following apparatus had been ordered for stock :—

	£	*s.*	*d.*
6 minimum thermometers, value -	6	0	0
24 storm signal cones -	15	6	0

—Approved.

Submitted—The following statements of work for December 1889 :—

MARINE BRANCH.

January 6th, 1890.

Examined 7 new logs.

Received from the lithographer 12 proofs and 1 revise of Aden Cyclone Charts, May and June 1885. Passed 4 charts for press.

Discussion of Red Sea data. Obtaining and charting wind and instrumental means, and charting currents.

Adding to the Guardafui Charts information lately received, and drawing isotherms.

Preparing and charting currents in all oceans.

Completing monthly cyclone tracks for the South Indian Ocean, and preparing annual charts.

Commenced the discussion of the data in the district south of latitude 35° S., and between longitudes 40° E. and 180° E.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

PANTAGRAPH ROOM.

December 31st, 1889.

Observatory Returns.—The copying of the "Hourly Readings" and the calculation of the means for five-day periods, for the year 1887, has been carried on steadily.

Harmonic Analysis.—The analysis of barograms for the year 1882 has been completed for three observatories, leaving but two observatories to complete the series.

Quarterly Weather Report.—The tables for Part II., 1880, have been begun, but are only slightly advanced ; the monthly charts for the part are nearly completed.

Miscellaneous.—Large size diagrams of wind pressure were prepared for Royal Meteorological Society. More time than usual was occupied in connexion with the sunshine returns in checking the adjustments of the instruments.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

January 1st, 1890.

Examinations.

May and *June*, 1889.—Completed.

July, 1889.—*Thermograms* and *Barograms*.

Weekly examination (on receipt) of curves and documents from all observatories.

Reports, &c.

April and *May* 1889.—"Notes of Errors" to all observatories.

March, 1889.—Report on work for month.

Absence through ill-health and the Christmas vacation have somewhat interfered with the progress of the work, and instructing Mr. Parsons has occupied much of my time during the month.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting :—

Adelaide Observatory.—Report on telegraphic determination of Australian longitudes.
Wellington, Meteorological Office.—Meteorology of New Zealand. 1888.
Melbourne Observatory.—Twenty-fourth Report of the Board of Visitors to the Observatory.
Washington, Signal Office.—Bibliography of meteorology. Part II.—Moisture.
Turin, Società Meteorologica Italiana.—Annuario meteorologico Italiano. Anno V. 1890.
Kew Observatory.—Report of the Kew Committee for the year ending October 31, 1889.
Tacubaya, Observatorio Astronómico Nacional.—Anuario. 1890.
Whipple, G. M.—Photography in relation to meteorological work.
Schreiber, P.—Ueber das Lamont' sche Verfahren zur Ableitung der täglichen Periode aus stündlichen Beobachtungen.
Busin, P.—Le temperature in Italia.
Manila, Observatorio Meteorológico.—Curvas meteorográficas. 1887.
Buchan, A.—The Physics and Chemistry of the Voyage of H.M.S. "Challenger." Part V. Report on atmospheric circulation.

The Chairman stated that he expected to leave England for India shortly, and that he would be absent probably for about three months. He would notify the circumstance to the President of the Royal Society.

63, *Victoria Street, January* 22, 1890.

PRESENT:

MR. F. GALTON IN THE CHAIR.

MR. BUCHAN. | THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 8) were read and confirmed.

Read—Letter 145 from Professor M. Foster, Secretary to the Royal Society, stating that the President and Council approved of the appointment of Mr. F. Galton as Deputy Chairman during the absence of General Strachey, and that they thought it unnecessary to appoint a new member of the Council.

Mr. Scott stated that the sanitary inspector for the parish had reported that the waterclosets, &c. in the Office were in bad order, and required thorough repair. This report had been referred to the landlord, who had made a proposal (Letter 2154) that the Office should bear two-thirds of the cost of such repairs as were necessary, and that he should bear the remainder.

Mr. Scott was instructed to ascertain the details of the alterations proposed by the landlord.

General Strachey having directed that, prior to replying to the letter of the landlord, a new lease for five years should be prepared for the consideration of the Council, the period of the last form (dated November 30, 1882) having expired.

The new form of agreement for the lease was submitted and approved, provided that certain slight alterations, suggested by the Council, were introduced into it.

An estimate was submitted from Mr. J. Fleming (Letter 63) for alterations in the system of urinals and basins, amounting to "about 80*l.* or 90*l.*"

Submitted—The following memorandum:—

FUTURE MARINE WORK.

The charts of the Red Sea are nearly completed, and it is therefore time for me to ask for instructions as to the work contemplated for the future.

The following resolution was contained in Minutes, 1887, p. 129:—

"It was resolved that the next district to be examined was to be that extending from Long. 40° E. to 180° E., and from Lat. 35° S. as far south as observations are available."

The information contained in the logs is given under the following heads:—

1. Currents.
2. Wind.
3. Pressure.
4. Temperature of Air.
5. Wet-bulb.
6. Cloud.
7. Weather.
8. Sea.
9. Temperature of Sea.
10. Specific gravity.
11. Remarks, including ice, whales, &c.

I should be glad to learn whether the Council wish the whole of this information to be extracted from the logs, or, if they decide to discuss only certain elements, which of the above subjects are to be dealt with. As soon as I receive this information, I shall venture to submit a plan of discussion for approval.

(Signed) C. W. BAILLIE.

January 22, 1890.

The Council decided that the following elements should be dealt with:—

1. Currents. 2. Wind. 3. Pressure. 4. Temperature of Air. 9. Temperature of Sea. 11. Remarks (ice and whales).

Mr. Baillie was invited to come in to the meeting, and was instructed to submit to the Hydrographer a plan of discussion as suggested in his memorandum.

Submitted—The following Statement respecting the Records from January to June 1889, received from the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 1876, 3rd January 1883, and 6th March 1889) :—

January to June 1889.	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	Fair.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient:—										
Due to stoppage of clock	0	0	4 hrs.	4 hrs.	2 hrs.	2 hrs.	0	0	1 hr.	2 hrs.
„ other causes	0	0	5 hrs.	4 hrs.	0	0	1 hr.	4 hrs.	0	0
Number of errors discovered:—										
By general examination	0	1	6	21	13	3	0	2	6	6
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0
Mean difference irrespective of sign	0·3	0·5	0·1	0·4	0·1	0·4	0·1	0·3	0·1	0·4
Residual difference (—Meteorological Office)	0·0	+0·1	−0·1	+0·1	0·0	+0·1	0·0	+0·1	0·0	0·0
Orientation verified	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—
RAIN-GAUGE:—										
Action of Instrument	Good.		Good.		Fair.		Good.		Bad to Good.	
Records deficient:—										
Due to stoppage of clock	0		0		0		0		0	
„ other causes	0		0		0		0		10 hrs.	
Number of errors discovered:—										
By general examination	2		4		2		4		11	

——	Aberdeen.		Falmouth.		Kew.		Valencia.	
BAROGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Do.	
Records deficient:—								
Due to stoppage of clock	0		0		0		1 hr.	
„ failure of light	0		0		0		0	
„ other causes	0		0		0		0	
Number of errors discovered:—								
In entry of standards	0		12		7		1	
„ calculating residuals	0		9		1		2	
„ applying „	3		38		5		28	
By general examination	6		13		17		35	
Results of 40 Remeasurements:—								
Greatest difference	·007		·009		·012		·008	
Mean difference irrespective of sign	·002		·002		·002		·002	
Residual difference (—Meteorological Office)	−·001		·000		+·001		·000	
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·001		·002		·002		·002	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Do	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	0	0	0	0
„ failure of light	0	3 hrs.	0	0	0	0	0	0
„ imperfectly moistened bulbs	—	0	—	0	—	5 hrs.	—	8 hrs.
„ partially frozen bulbs	—	176 hrs.	—	23 hrs.	—	119 hrs.	—	0
„ other causes	13 hrs.	8 hrs.	0	0	0	2 hrs.	2 hrs.	2 hrs.
Number of errors discovered:—								
In entry of standards	1	3	6	5	1	1	20	9
„ maxima and minima	2	—	14	—	9	—	21	—
By general examination	8	13	15	22	9	15	24	21
Results of 40 Remeasurements:—								
Greatest difference	0·2	0·2	0·2	0·2	0·2	0·3	0·4	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	−0·1	+0·1	+0·1	0·0	−0·1	−0·1	+0·1	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·2	0·2	0·2	0·1	0·1	0·2	0·2	0·2

Aberdeen.

Rain-gauge.—The attachment of the papers somewhat unsatisfactory, and traces occasionally faint.

Barograph.—A decided second edge, or penumbra, to lower edge of trace, when barometer reading is below 30 inches; this disfigurement increases with decrease of pressure. The stated times of ending are not always in accord with the traces.

Thermograph.—Many of the curves are disfigured by secondary images, especially the zero lines.

Armagh.

Anemograph.—The velocity traces were intermittent at low rates, owing to a slight mechanical defect. The velocities recorded are very much lower than at the other observatories, and the stated times of ending are not always in accord with the traces.

Rain-gauge.—Traces faint, and attachment indifferent. The snow or ice which may be in the funnel of the gauge at the time of changingthe curves, on being melted, is not poured into the gauge and the trace thereby shown on the curve. Occasional disagreement exists between the stated times of beginning and ending of the traces. On the occasions of Dr. Dreyer's absence, the attachment of rain papers is very unsatisfactory and inaccurate, and the differences between the daily amounts by the two gauges, are much greater than the observations are taken by the regular observer.

General.—As the gentleman (Rev. Mr. Faris) who observes in Dr. Dreyer's absence is unable to attend at the usual time of changing the various curves, the time of changing is about 9.30 a.m. on these occasions.

Falmouth.

Rain-gauge.—The traces are very unsteady at times, and the attachment of the papers is not satisfactory.

Barograph.—There is apparently something wrong with the action of the instrument (see the residuals, 19th March, &c.). Attention has been drawn to this subject from time to time without result. The stated times of ending are not always in accord with the ends of traces.

Thermograph.—This instrument was working in a satisfactory manner, and the results are good.

Kew.

Anemograph.—The pricker was out of position, or frequently not marking, thus causing loss of checking power on times and action of instrument; the pricker was brought into line on several occasions. The regulation of clock was not always good.

Barograph.—The definition at times is very good, but at others unsatisfactory, and as the latter condition is not confined to any particular part of the scale, it is apparent that it arises from preventable causes, probably stray or defective light, or in the development, as curves of a yellow tint are good, while those of a grey tint are unsatisfactory. The time occupied in changing curves occasionally amounts to a quarter of an hour, instead of one or two minutes. Indifferent regulation of the clock, which appears to be unavoidable, points to the existence of some defect.

Thermograph.—Curves occasionally disfigured by slight secondary images. The zero lines were altered to the summer positions on the 4th May, and subsequent to that date the definition is not good below 50°. 19 per cent. of wet standards were rejected during the month of June.

Valencia.

Rain-gauge.—This instrument acted imperfectly at times during the early part of the period; "the tube of the funnel was found to have become indented by resting on the winding square of "the clock, and choked with dirt." Another impediment was the accumulation of water below the gauge, preventing the proper action of the Stonyhurst lifter (see M.O. 324). Attachment of papers far from satisfactory at times.

Anemograph.—During June the stated times of beginning and ending were not in strict agreement with the traces.

Barograph.—The definition varies. To the lower edge of some traces there is a penumbra, while with others the definition is all that can be desired, and tends to prove that the defects arise from preventable causes.

Thermograph.—Curves sometimes disfigured by "stray light caused by the black peeling from "the stem of the thermometer"; definition not always good. Of the standards rejected from the work of the observatory, a large proportion differ from the tabulated values by the amount of the index error of the instrument; this, apparently, points to the non-application or dual application of the said index error. The entry of the standard readings on the curves requires greater care.

(Signed) T. E. ALLEN.

Mr. Galton made further communications about the system of frames for exhibiting notices of the weather proposed by him (Minutes, January 8), and exhibited a specimen board for the inspection of the Council.

Mr. Scott was instructed to ascertain from Messrs. Willing the cost of enamelled iron plates, as compared with that of painted wood.

Read—A letter from Mr. Baillie stating that since last meeting 14 logs had been received, nine of them being "excellent." Mr. Scott was directed to present the charts O. 27 to Captain Mitchell and O. 32 to Captain Owen, and to convey the best thanks of the Council to the other observers.

Read—Letters 69 from Mr. Dines, and 92 from Mr. F. Osler, relative to anemometer experiments. Mr. Buchan was requested to read them, and report thereon to the Council.

Submitted—The following Report:—

REPORT of INSPECTION of the ENGLISH STATIONS, 1889.

TELEGRAPHIC REPORTING STATIONS.

Dungeness, inspected June 7th.—There appears to be some improvement in the observations taken at this station, but the wet-bulb thermometer was dirty and the bulb itself much crusted with lime. I found, by testing, that the water used on the day of my visit was hard. There is a rather large difference between the corrected readings of the reporting and check barometers, but the first named instrument is correct. I question whether the lowness of the barometric readings, as frequently reported from this station, is due to carelessness on the part of the observers. As regards the low temperatures sometimes reported from Dungeness, I adhere to my opinion that these are correct, and are principally due to the character of the soil. The Dungeness temperatures give a very inadequate idea of the climatology of the neighbouring coast. The exposure of the station is, however, excellent. Mr. Curnow has been removed from this station.

Jersey (St. Aubin's), June 9th.—The reports from this station continue to be very good. The situation of the sunshine recorder was at the time of my visit not very satisfactory. The instrument was sheltered in early morning and late evening in summer; and the extreme steepness of the slope on the summit of which it was situated rendered it necessary for the observer to employ a substitute to attend to the instrument. I subsequently received a letter from Mr. Fisher, suggesting a new site, half way between St. Aubin's and St. Brelade's, at the summit of the hill leading down into the latter village, where the exposure would be perfect, in the garden of a lady named Mrs. Cox, who promised to take charge of the instrument. After some correspondence, a personal friend in whose skill in such matters I have full confidence, the Rev. H. W. P. Yorke, of St. Helier's, removed the instrument to the new situation on November 20th.

I notice that, as anticipated, the summer maxima are higher than those reported when the thermometers were at Noirmont.

Hurst Point, June 12th.—The instruments at this station were in good order. The thermometer screen much needed repairs and re-painting, which has since been done. The observer still continues every now and then to make inaccurate reports.

Scilly (St. Mary's), June 15th and 16th.—The observer, Mr. Thomas, was somewhat ill and unequal to taking accurate observations at the date of my visit. I gave careful instructions to the observer's son (who frequently attends to the observations) as to reports of changes of pressure indicated by the self recording aneroid, a matter of some importance at this station. Mr. A. Hicks continues to be at any time ready to assist in or to conduct the observations.

A new block was needed for the rain-gauge and was ordered.

The anemometer was in as good working order as usual, giving occasionally blurred anemographs, owing to the saltness of the water particles in the atmosphere. One of the clock wheels required much rubbing with emery, and needs more frequent lubricating. This I attended to.

Prawle Point, June 18th.—The observations at this station, for which Mr. Mehegan seems to be almost entirely responsible, are very accurate, and are carefully reported. The minimum No. 307 again contained exactly $0^{\circ}\cdot9$ of detached spirit, a defect which had only recently recurred and for which the observer had applied a correction. By refrigerating the bulb and applying strong heat to the other end of the tube, I rectified the defect for the time.

Spurn Head, July 12th.—The instruments at this excellent station are in good order, and Mr. Watson, the new lightkeeper, appears to attend to them carefully and to read them with accuracy. A spare thermometer seemed a desirable acquisition and has been sent since my visit. The station would be as faultless a one as could be found on our coasts, were it not for the drifting of the dry sand around the outdoor instruments.

Barrow-in-Furness, July 19th.—Mr. Whitworth was absent from home on the day of my visit. The thermometers were in good order, but the wet bulb was not clean. I only succeeded in expelling an exceedingly small bubble of air from the barometer tube. This tube has been since refilled and has been employed again since August 1st. A new rain-gauge had been substituted for the old one previously to my visit. The instrument is a good one and has a fair exposure. As regards the winds felt at this station I may be permitted to refer back to previous inspection reports.

North Shields, July 24th.—An accident having occurred at Newcastle to the barometer which I had hitherto employed this year as my standard, I was unable to use a mercurial standard in my inspection of this station and of York. The barometers were in good order. They will probably have to be removed from their present site in the course of the coming winter, as new post office buildings are being erected. I have given full instructions as to their removal.

The Dockway Square is now open to the public, and is much employed for tennis. Children frequently meddle with the rain-gauge and have already injured it. The observer, Mr. J. Irvine,

recommends that the outdoor instruments should be shifted towards the south-west corner of the Square, where they will be at a much safer distance from the entrance gate. I would suggest that the gauge should be surrounded by an iron fence similar to that employed at York and some other places. Except this Square there appears to be no place in the immediate neighbourhood available for the outdoor observations.

York, July 26th.—The barometer No. 156, employed as the reporting instrument at this station was last year supposed to be out of order, and No. 138 was sent down for employment either instead of, or to check, the readings of the former instrument. The observer reported No. 138 to be also out of order, and in November 1888 No. 300 was sent down to York, but was not hung in position, loose mercury being noticed in the box containing the instrument. I found both 156 and 138 to be in perfect order. As regards No. 300, I found this instrument to read 0·072 too low. I inverted and extracted the tube and found only a very minute quantity of air in the air-trap. In the box which had contained the instrument I found 18 drachms of mercury. I recommend that the old barometer should be retained as a reporting barometer, and No. 138 as a check for the present; but it will perhaps be better that No. 138 should eventually be used as the reporting instrument.

Yarmouth, September 18th.—The observations taken at this station continue to be in all respects satisfactory, and I found all the instruments in good order.

Cambridge, September 18th.—Mr. Todd was again absent from the observatory at the date of my visit. The instruments were all in good order. The low wind velocities characteristic of this station are, in all probability, as I have previously mentioned, the result, to a great extent, of the wooded character of the country round Cambridge.

Oxford, September 19th.—The reports from this station are very good, and I found all the instruments in a satisfactory condition. There is a slight deposit on the wet-bulb.

Loughborough, September 27th.—The observer had to leave his house on business almost immediately after my arrival, and I therefore could not on this occasion compare his readings of the instruments with my own. The standard barometer having been conveyed in a warm railway carriage and omnibus, had a much higher temperature when suspended than the reporting barometer at the station. I had also to suspend the former out of doors, not finding a place which I liked to avail myself of within the house, and the sun shone occasionally on part of the instrument. At the time of comparison the attached thermometer of the standard read 3°·9 higher than that of the reporting barometer. Correcting to equivalent temperatures the standard read 0·021 in. above the observer's instrument, but as I do not consider the comparison satisfactory I have entered no figure in the table. All the other instruments were in good order, and no observer could be more punctual and painstaking than Mr. Berridge. The thermometer corrections are not in accordance with my expectations.

The following, which are not Telegraphic Reporting Stations, were inspected by me this year.

Eastbourne, June 8th.—The observations at this station are good, and I found all the instruments to be in excellent order. The sunshine recorder has been raised one ft. and erected on the middle of the turret (instead of on one side) upon a substantial pedestal. The observer undertook to send the readings of the solar radiation thermometer on overcast days, which had not hitherto been done. The station, which is in the hands of the Town Council, seems likely to be permanently maintained.

Plymouth, June 13th.—Dr. Merrifield was absent at the time of my visit. The instruments were in good order. The rain-gauge occupies a much better site than that which it had at the Navigation School. The sunshine recorder had a very fair, but not absolutely perfect, exposure. It required a trifling adjustment. The old screen is in use and is a wall screen. The observations appear to be carefully conducted.

Prestwich, July 13th.—Dr. Clunn, who superintends the observations for this station, was much engaged at the time of my visit, and the observer who usually takes the readings was absent. The returns from this station unfortunately continue to be greatly in arrear. The barometer is correct. The outdoor instruments are excellently situated. The thermometers were compared in 1878 in melting ice, and the corrections then obtained were assumed to vary as the old Kew corrections throughout the scale, but at 55° the 1878 corrections are (if my comparisons this year were correct) inapplicable.

Isle of Man (Cronkbourne), July 21st.—Mr. Moore was absent at the time of my visit. His deputy takes the observations with great accuracy. The instruments were in excellent order, with the exception of the grass minimum, the tube of which contained 2°·7 of detached spirit, which I restored. Mr. Murphy had applied an additive correction of 2° since noticing the defect. The returns from this station are good.

Isle of Man (Douglas, Prospect Hill), July 22nd.—Since my inspection of this station in 1887 all the outdoor instruments have been moved to a new site about 70 yards from their former position, but on the same level. The ground now occupied by them (a plan of which I have sent to the Meteorological Office) affords an improved, though not absolutely perfect, exposure. The barometer is not a reliable instrument. It had at the time of my visit a considerable error, but I re-adjusted the tube on the scale so that it read correctly when I left the station. The thermometers were in good order; and the returns appear to be carefully attended to.

Newton Reigny, July 22nd.—This is a most excellent station. All the instruments were in admirable order, and the returns are very complete and accurate. The sunshine recorder has an

almost perfect exposure. Mr. Benn and his assistant are most careful in the attention bestowed on the observatory.

Seaham, July 25th.—The instruments at this station were found to be in good order, except that there was a considerable deposit on the wet bulb, the muslin of which requires to be very frequently changed. The corrections of the dry and wet-bulb thermometers, as determined by me this year, differ from those obtained in previous years, but the old corrections may advantageously be retained for the present. A new door was required for the screen, which also needed to be re-painted. Mr. Aird had the repairs attended to directly after my visit. The returns from this station are satisfactory.

Durham, July 25th.—Mr. Carpenter was absent at the date of my visit, and his assistant also. I found all the instruments at the observatory in very good order, except the grass minimum, which contained 1°·3 of detached spirit. A correction of this value had been in use. The returns from Durham are good and complete.

York, July 25th and 26th.—The thermometers were in good order. The returns from the station are fairly good. I do not, however, consider the observer to be entirely trustworthy as regards punctuality and accuracy.

The sunshine recorder is still kept at the Friend's School, Bootham. There is some little difficulty in getting it well and punctually attended to during the vacations, but the records are on the whole satisfactory. Mr. R. Thompson expressed his willingness to take the instrument into his own charge at his new residence (Dringcote), should the change be considered desirable. The question may, I think, be deferred till next inspection.

Oswald Kirk.—The sunshine recorder at this place is the property of Mr. R. Thompson. It is well attended to, but the exposure is not quite perfect.

Epsom, September 17th.—It being still vacation at the Royal Medical College, the observer was absent. His substitute appeared to require a little instruction in reading the barometer. The instruments were in good order. Errors of reading and reduction are still noticeable in the returns from this not unimportant station. The barometer, when the correction for index error has been employed, reads ·009 too low.

Rugby, December 9th.—The returns from this station are still of little value, as the a.m. readings of the barometer are not punctually taken, and the outdoor observations are left to Mr. Kirk, the gardener, whose observations of wind and cloud appear to me of no value. He reads the thermometers well; and all the instruments (except the raingauge, which is nearly worn out) are in excellent order. The barometer is inconveniently situated. I have advised that the raingauge be shifted to the south-east of its present position (where it is slightly sheltered), and be repaired. I have but little hope that the returns from this station can, at least for some years to come, be usefully employed, as the school arrangements interfere with the punctual performance of the meteorological work.

Sutton Coldfield, December 31st.—The returns from this station have been until lately considerably in arrear, but there is, I think, every prospect of their now being punctually attended to. There has been some falling off in punctuality since Mr. Fletcher left the station. However, Mr. Marston, the new observer, promised me to pay full attention to the work. His assistant, Mr. J. H. Smythe, read the instruments with great accuracy. The Jordan's sunshine recorder is on the south corner of the roof of the municipal buildings; it has an admirable exposure, but the time-lines do not seem correctly printed. Barometer is a Fortin by Bailey of Birmingham. It is certified as having a very small error, but at 29·80 it read ·005 lower than my standard. The outdoor instruments were situated in Mr. Fletcher's garden, where the position is very good. Mr. Marston informed me that they would shortly have to be moved into his own garden, where the position is by no means so well exposed. The removal actually took place, as I am informed, on January 6th. The observer promised to have the screen, which has hitherto been of a green colour, painted white on the date of its removal.

I had written to Mr. Jevons, the observer at *Market Rasen*, to inform him of my coming visit, as it was at a time of year which might be inconvenient to him. I much regret to say I received a telegram from him (which I have sent to the Office) informing me that he has to relinquish his observations.

The following table gives the results of the comparisons made by me in 1889, and contains its own explanation. The barometer employed by me as a standard up to July 24th was the contracted Adie No. 216. The tube up to the time of its unfortunate breakage remained free from air. After that date I employed as a standard the uncontracted Adie No. 590, which has also kept in excellent order. The results of the thermometric comparisons may be, I think, regarded as fairly satisfactory. They do not, however, on the average show much improvement from year to year, nor do I expect them to do so until the date of the construction of every instrument is engraved on the glass by the makers, and until no instruments are employed which are not four years old. The raingauges were all found in good order except in those cases mentioned in this report. The same remark may be made of the sunshine recorders. But to these latter instruments I intend to devote a separate and minute investigation in the course of the present year. At one station only of those this year inspected was the barometer tube found to contain air. In three only was the thread of spirit in the minimum thermometer found to be broken, and in none of these had the defect escaped the observer's attention. Care as regards the cleanliness of the wet-bulb and accuracy in reading thermometers to the tenth of a degree, show an unmistakable improvement.

Name of Station. (The Names of the Telegraphic Reporting Stations are in *Italics*.)	Barometer.			Thermometer.											General Condition.	Name of Station.
	Difference of Reporting from Inspector's Barometer.	Difference of Check from Inspector's Barometer.	Difference of Observer's from Inspector's Readings.	Temperature of Water.	Dry Bulb.		Wet Bulb.		Maximum.		Minimum.		Spare.			
					Correction to reduce to Inspector's Standard.	Correction hitherto applied.	Correction to reduce to Inspector's Standard.	Correction hitherto applied.	Correction to reduce to Inspector's Standard.	Correction hitherto applied.	Correction to reduce to Inspector's Standard.	Correction hitherto applied.	Correction to reduce to Inspector's Standard.			
Barrow	−·011	+·002	—	60·1	−0·3	−0·4	−0·3	−0·3	−0·1	−0·1	0·0	−0·1	—		B	*Barrow.*
Cambridge	+·002	—	—	57·0	−0·4	—	−0·3	—	−0·8	—	0·0	—	—		A	*Cambridge.*
Dungeness	·000	−·017	−·003	64·8	−0·1	—	0·0	—	0·0	—	−0·1	—	—		—	*Dungeness.*
Hurst Point	−·004	−·005	+·002	59·7	−0·1	—	−0·05	—	0·0	—	−0·2	—	—		—	*Hurst Point.*
Jersey	−·008	−·001	·000	62·2	−0·3	—	−0·1	—	−0·1	—	−0·05	—	—		A	*Jersey.*
Loughborough	—	—	—	57·4	−0·45	0·0	−0·4	0·0	+0·5	0·0	+0·2	−0·1	+0·6		A	*Loughborough.*
Oxford	−·028	—	−·001	55·0	−0·05	−0·4*	0·0	−0·4*	−0·1	−0·7*	0·0	−0·2	—		A	*Oxford.*
Prawle Point	−·001	+·005	·000	59·4	+0·1	—	0·0	—	+0·3	—	0·0	—	—		A	*Prawle Point.*
Scilly	+·002	−·001	−·002	56·8	−0·1	—	0·0	—	−0·6	—	+0·1	—	−0·1		A	*Scilly.*
Shields	−·008	−·001	·000	57·9	−0·1	—	0·0	—	0·0	—	+0·2	—	−0·4		A	*Shields.*
Spurn Head	−·004	+·005	+·001	61·6	−0·2	—	−0·3	—	+0·2	—	+0·2	—	—		A	*Spurn Head.*
Yarmouth	+·008	−·003	−·002	57·2	+0·2	—	−0·6	—	−0·3	—	−0·1	—	—		A	*Yarmouth.*
York	−·013	−·002	−·001	56·9	−0·1	—	−0·1	—	−0·4	—	+0·1	—	—		A	*York.*
Cronkbourne	·000	—	−·002	60·0	−0·3	—	−0·4	—	0·0	—	0·0	—	+0·1		A	Cronkburne.
Durham	−·008	—	—	55·0	0·0	0·0	0·0	0·0	0·0	+0·1	+0·7	+0·5	+1·3		A	Durham.
Eastbourne	+·002	—	·000	60·1	+0·05	0·0	+0·1	0·0	+0·05	−0·1	+0·1	0·0	−0·4		A	Eastbourne.
Epsom	−·009	-	−·009	53·2	0·0	—	+0·1	—	+0·2	—	0·0	—	—		B	Epsom.
Newton Reigny	−·004	—	·000	55·3	−0·2	−0·3	−0·3	−0·4	−0·1	−0·3	+0·2	0·0	+0·4		A	Newton Reigny.
Plymouth	−·035	—	—	62·3	−0·2	—	−0·1	—	−0·5	—	+0·6	—	0·0		A	Plymouth.
Prestwich	−·002	—	+·002	61·1	−0·1	−0·3	0·0	−0·2	−0·1	−0·5	+0·1	−0·2	+0·3		A	Prestwich.
Prospect Hill	·000	—	·000	60·0	0·0	0·0	+0·05	0·0	−0·2	−0·3	+0·1	−0·1	−0·6		B	Prospect Hill.
Rugby	−·003	—	−·004	43·2	0·0	0·0	0·0	0·0	+0·25	—	+0·3	—	0·0		C	Rugby.
Seaham	—	—	·000	61·4	−0·5	0·0	−0·4	0·0	+0·4	+0·5	+0·4	+0·5	—		A	Seaham.
Sutton Coldfield	−·006	—	+·001	39·5	−0·1	—	−0·2	−0·1	+0·3	0·0	+0·02	0·0	—		A	Sutton Coldfield.
York	−·013	−·002	−·001	56·9	−0·1	—	−0·1	—	+0·1	—	+0·7	—	—		B	York.

*Note.— Mr. Stone has re-tested the thermometers, and finds that their previous corrections continue to apply, and that his readings are sensibly correct.

Fishery Barometer Stations.

At the desire of the Secretary, I visited a few Fishery Barometer Stations this year.

On June 10th I visited the harbour-master at *Gorey*, Jersey, in hopes that the thick and rough weather prevailing might enable me to get together an audience of fishermen. In this I was unsuccessful, perhaps on account of the heavy rain. The number of fishing boats now kept at this station is very small, and is rapidly decreasing. The fishery barometer reads low, but contains no air.

I convened a meeting of fishermen in the a.m. of Saturday, July 20th, at *Port St. Mary*, Isle of Man. The weather was all that could be desired, being thick and wet with an E.S.E. wind. I lectured for about 80 minutes to about 30 men, many of whom, especially the younger, appeared very attentive. Mr. Luattrough, the harbour-master, gave me every assistance. The fishery barometer at this station read 29·720 at 60°·2, while my standard read 29·710 at 60°·5. The fishery barometer is well placed, and the tube is free from air.

On the same day in the p.m. I gave a lecture to about 30 men in the Sailors' Rest at Peel. The men were most attentive; some of the older men held peculiar tenets as to the action of the barometer. The weather was most propitious, enabling me to foretell as probable the strong N.W. breeze which burst over the island the following afternoon. The fishery barometer is well situated on the pier close to the Sailors' Rest, and a few yards from the harbour-master's offices. The instrument (184) read 29·605 at 64°·9. The standard suspended by me within the building at the same elevation read 29·608 (corrected for index error) at 65°·5. The Kew certificate gives ·000 as index error for No. 184.

The case of the cistern of the fishery barometer is much coated with rust externally.

I am of opinion that a short manual or guide to the use of the fishery barometer, containing knowledge brought up to date, expressed in language suitable to the attainments of our fishermen, would form a useful treatise, and be fully appreciated by the majority of those for whom it would be intended.

(Signed) W. Clement Ley.

Submitted—The following list of publications which had been received since the last meeting :—

Merrifield, J.—Meteorological summary for 1889.

Calcutta, Meteorological Office.—Meteorological summary of the monsoon period of 1889.

Kew, Royal Gardens.—The weather plant. (Bulletin for January 1890.)

Utrecht, K. nederlandsch meteorologisch Instituut.—Barometer-standen en winden in de Golf van Aden en den Indischen Oceaan bij Kaap Guardafui.

Bebber, W. J. van.—Abhängigkeit der Stärke des Unterwindes von der Unterlage.

Combe, J.—Meteorological diagrams illustrating the temperature of the sea and air at Torquay. 1859-1867. Presented by J. W. Combe, R.N.

Chemnitz, K. sächsisches meteorologisches Institut.—Jahrbuch. 1888.

Brisbane, Chief Weather Bureau.—Meteorological report for 1887.

63, *Victoria Street, February* 5, 1890.

PRESENT:

MR. F. GALTON IN THE CHAIR.

MR. STONE. | THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 22) were read and confirmed.

The agreement for a renewal of the lease of the apartments occupied by the Office for a term of five years from January 1, 1890, was submitted (Letter 204). It was approved conditionally, on a more explicit consent being obtained from the landlord in writing to the proposed exhibition of weather notices on the balcony.

A rough estimate (Letter 54) was submitted of the cost of the frames and other apparatus for the exhibition of weather notices (Minutes, p. 70). It was resolved that these should be ordered.

The list of the sanitary alterations suggested by the landlord (Minutes, January 22) was submitted, of which he proposed that the Council should bear two-thirds of the cost. His proposal was approved, subject to the opinion of the sanitary officer that the suggested alterations were adequate (P.C. 303).

Mr. Scott was instructed to obtain a fresh estimate for the remainder of the work, from Mr. Rayment, Pont Street.

Read—A memorandum from Mr. Baillie, reporting that since last meeting five logs had been received, four of them being "excellent."

Mr. Scott was instructed to present the Charts (O. 76) to Captain Saul and Captain Alexander Stewart, and to convey the best thanks of the Council to the other observers.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the 17th December 1889:—

(1.) WARNINGS ISSUED.

Summary.

A + B (successful) - - - -	= 120
C (failures) - - - - -	= 30

(2.) GALES EXPERIENCED BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
5th February 1890.

Submitted—The following statements of work during January 1890:—

MARINE BRANCH.

February 4, 1890.

Examined 20 new logs.

Received from the lithographer proofs and revises of 8, and passed for press 9, Aden cyclone charts for May and June 1885.

Obtaining and charting mean results of Red Sea winds and instrumental observations, and charting currents.

Charting additional information for the vicinity of Cape Guardafui and drawing areas representing the distribution of cold and warm water.

Preparing and charting currents in all oceans.

Preparing annual charts of Cyclone Tracks in the South Indian Ocean.

Examining logs for the route between the Cape of Good Hope and New Zealand.

Completing the list of land data in the Pacific Ocean, and ascertaining for Captain Maclear, R.N., the amount of material available in the neighbourhood of the Eastern Archipelago.

Indexing data in ocean 10-degree squares.

Mr. R. H. Hooker spent several days in the Marine Room with the object of studying the nature of the work carried on.

The branch has been somewhat inconvenienced during the month through the absence of members of the staff on sick leave.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council,

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.
(30th November 1889 to 31st January 1890.)

Weekly Weather Reports:—

1888 *Monthly Summaries* not taken in hand since last report.

1889. *Weekly numbers* all issued promptly to date.

Appendices I. (last two numbers) and II. to IV. all completed and sent to printer. Proof of No. I. has been received, revised, and returned to printer "for press."

Monthly Summaries—issued up to July—later numbers not completed yet, owing to the large amount of sickness among the staff.

1890. *Weekly numbers* all issued, in revised form. The reports now cover the period Sunday to Saturday. The maps are printed (by lithography) in two colours, and the numbers are transmitted by Thursday (instead of Saturday) evening's post.

Daily Weather Report.—1889 and 1890. All numbers issued promptly to date. Monthly correction and addition sheet for December issued.

Primary checking of Storm Warnings.—1889. Done to date.

Note.—The new division of "coasts" for storm warning purposes (Minutes, 1888, p. 127) has now been brought into use.

Checking of Daily (8.30 *p.m.*) *Forecasts.*—Completed *almost* to date.

Sickness of Staff.—Owing to the influenza the whole of the staff in this branch have suffered more or less—

Mr. Brodie has been confined to his house since 28th December;
Mr. Rigby was confined to his house for eight days;
C. Pycock " " a week;
Commissionaire Petchley " " " ;

and on many occasions those who attended were not in condition fit for working. On January 1 only one of the staff was in good health. The consequence is that it has been with difficulty that even the urgent parts of our routine work have been performed, and on one day the daily report was not issued up to time.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

January 31st, 1890.

Observatory Returns.—The calculation of the hourly means of the various elements, for five-day periods, for 1887, is still in hand and is now about half completed.

Harmonic Analysis.—The analysis of the barograms for 1882 has been finished, and as this completes the period of twelve years for which the thermograms were similarly treated, the work has been laid aside until it is decided in what way the results are to be worked up.

Quarterly Weather Report.—The tables for Part II., 1880, are completed, and the general summary commenced, but not much advanced. The monthly charts are also finished.

Miscellaneous.—Various small matters have occupied in the aggregate a good deal of time, and in addition a good deal of work has arisen in connexion with the hourly means of pressure and temperature now in process of calculation.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

1st February 1890.

Examinations.

July and *August* 1889.—Completed.

October to *December*, 1889.—Partial examination of the Valencia work for the Registrar-General of Ireland.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

June 1889.—"Notes of Errors" to all observatories, and report thereon.

January to *June* 1889.—Report on work to Council.

Re Falmouth barograph curves.

The absence of members of the staff on other duties, and through ill-health, has greatly interfered with the progress of the work.

(Signed) T. E. ALLEN.

Submitted—The following report on the 8.30 p.m. forecasts for December 1889 :—

The letters used have the following signification :—

a=complete success. | **c**=partial failure.
b=partial (*i.e.* more than half) success. | **d**=total failure.

Districts.		Per-centages.			Per-centage of Success. a + b.
		Wind.	Weather.	Average Forecast.	
Scotland, N.	a	29	32	31	66
,,	b	39	32	35	
,,	c	19	29	24	
,,	d	13	7	10	
Scotland, E.	a	52	39	46	78
,,	b	29	35	32	
,,	c	16	16	16	
,,	d	3	10	6	
England, N.E.	a	42	32	37	71
,,	b	29	39	34	
,,	c	13	16	15	
,,	d	16	13	14	
England, E.	a	58	42	50	83
,,	b	20	45	33	
,,	c	16	13	14	
,,	d	6	0	3	
Midland Counties	a	48	45	47	72
,,	b	19	32	25	
,,	c	23	20	22	
,,	d	10	3	6	
England, S.	a	52	48	50	81
,,	b	23	39	31	
,,	c	19	13	16	
,,	d	6	0	3	
Scotland, W.	a	35	35	35	61
,,	b	29	23	26	
,,	c	26	16	21	
,,	d	10	26	18	
England, N.W.	a	32	42	37	69
,,	b	35	29	32	
,,	c	23	10	17	
,,	d	10	19	14	
England, S.W.	a	42	39	41	75
,,	b	29	39	34	
,,	c	6	9	7	
,,	d	23	13	18	
Ireland, N.	a	29	55	42	75
,,	b	42	23	33	
,,	c	13	3	8	
,,	d	16	19	17	
Ireland, S.	a	32	45	39	65
,,	b	29	23	26	
,,	c	16	10	13	
,,	d	23	22	22	
Summary.					
British Isles	a	41	41	41	73
,,	b	30	33	32	
,,	c	17	14	15	
,,	d	12	12	12	

Submitted—The following statement of accounts for the nine months ending 31st Decembe 1889 :—

Income.	£ s. d.	£ s. d.	Expenditure.	£ s. d.	£ s. d.
Balance from year 1888–89	- -	2,777 7 10	Administration :		
Proportion of vote -	- -	11,475 0 0	Payment of Council -	750 0 0	
Repayment of expenses charged under—			Secretary - -	600 0 0	
(1.) Incidental expenses	6 17 5		Salaries and wages -	606 2 8	
(2.) Special researches -	5 8 4		Rent, fuel, and lighting -	518 14 0	
(3). Observatories -	1 1 3		Furniture and fittings -	123 2 7	
		13 7 0	Incidental and contingent expenses -	239 1 9	
Supply of Weather Information :			Expenses incidental to International Meteorological Congress	5 2 0	
D.W. Charts and Forecasts - -	178 1 4		Pensions - -	140 2 3	
6 p.m. Charts -	18 15 0				2,982 5 3
Information for Press Agencies, &c. -	70 5 4		Special Researches -	- - -	493 17 7
Telegrams - -	154 8 3		Land Meteorology :		
		421 9 11	Observatories and stations - -	1,498 8 11	
Sale of Instruments, &c. :			Discussion and reduction of observations -	1,102 18 0	
Royal Navy account -	3 14 1				2,601 6 11
Mercantile Marine account - -	57 18 4		Weather Information and Forecasts :		
		61 12 5	Telegraphic reports and storm warnings -	1,832 4 3	
Commission charged on work done for Colonies, &c. - -	- -	22 17 1	Preparation and issue of reports and forecasts - -	1,339 13 5	
					3,171 17 8
			Inspections :		
			Salaries and travelling -	- - -	521 4 3
			Ocean Meteorology :		
			Discussion and reduction of observations -	1,190 17 0	
			Expenses incidental to the supply of instruments :		
			Proportion for care and issue of instruments -	150 0 0	
			Royal Navy -	428 5 7	
			Mercantile Marine-	283 6 4	
			Distant island and coast stations -	2 14 9	2,055 3 8
			Balance - - -	- - -	2,945 18 11
		£14,771 14 3			£14,771 14 3

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council - - - -	750 0 0	By cash at Bank - - -	3,261 5 9
„ contracts and outstanding accounts -	433 13 0	„ „ at Office - - -	84 10 0
„ Post Office (partly estimated) -	310 19 6	„ sundry debtors - - -	632 7 6
„ sundry creditors - - -	512 11 10	„ H.M. Exchequer - - -	975 0 0
„ balance - - - -	2,945 18 11		
	£4,953 3 3		£4,953 3 3

Submitted—The following memorandum (Minutes, January 22), which was approved :—

FUTURE MARINE WORK. (South Indian Ocean.)

1. *Currents.*—To be taken from the discussion now in progress for all Oceans.
2. *Wind.*—To be grouped in areas of 1° of Latitude by 5° of Longitude. Any combination of these spaces can be arranged as necessary.
3. *Pressure.*—To be dealt with on similar lines to the method sanctioned for publication No. 76 (Pressure Charts for all Oceans).
4. *Temperature of Air.*—To be dealt with in a similar manner as the Pressure.
5. *Temperature of Sea.*—To be dealt with on similar lines to the method sanctioned for publication No. 59 (Sea Temperature Charts for all Oceans).
6. *Ice and Whales.*—To be plotted on charts in geographical position.

(Signed) C. W. BAILLIE.

23rd January 1880.

P.S.—I should be glad if the Council will inform me whether we may obtain material, where necessary, from any available outside source.

Mr. Baillie was authorised to apply for information from such extraneous sources as he may think likely to be serviceable, and to proceed with the work.

Reported—That the following instruments were required for stock, to meet demands :—

On "A." Account.

	£	s.	d.
25 aneroids, estimated cost - - - -	60	0	0
25 barometers, estimated cost - - - -	112	0	0
144 water bottles for wet-bulb thermometers - -	2	8	0

On M.O. Account.

2 glass spheres for sunshine recorders - - -	8	0	0
2 Stevenson's screens - - - - -	4	10	0

(Signed) R. STRACHAN.

To R. H. Scott, F.R.S., Secretary M.O. 1890/2/3.

—Approved.

Submitted—The following list of publications which had been received since the last meeting :—

Frankfurt am Main, Physikalischer Verein.—Jahresbericht. 1887-8.
Harding, C.—Atlantic weather and rapid steamship navigation.
McLandsborough, J.—Meteorology of Bradford for 1889.
Hill, S. A.—The psychrometer and the condensing hygrometer.
Glyde, E. E.—Abstract of meteorological observations at Kirkham, Babbacombe, Torquay, during the year 1889.
Wild, H.—Neue Form magnetischer Variations Instrumente und zugehörender photographischer Registrir-Apparate mit Scalenablesung.
Hinrichs, G.—Report of the Iowa Weather Service. 1878–80, 1882, 1884–5, 1887.
Hellmann, G.—Die Anfänge der meteorologischen Beobachtungen und Instrumente.
Manchester, Sheffield, and Lincolnshire Railway.—Monthly statement of rain fallen in the year 1889.
Paris, Service hydrométrique du Bassin de la Seine.—Résumé des observations centralisées pendant l'année 1888.
—— —— Observations sur les cours d'eau et la pluie centralisées pendant l'année 1888.
Wollny, E.—Untersuchungen über das Verhalten der atmosphärischen Niederschläge zur Pflanze und zum Boden.
—— Untersuchungen über den Einfluss der Farbe des Bodens auf dessen Feuchtigkeits verhältnisse und Kohlensäuregehalt.

63, *Victoria Street, February* 19, 1890.

PRESENT:

MR. F. GALTON IN THE CHAIR.

MR. BUCHAN.	MR. STONE.
PROFESSOR DARWIN.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 5) were read and confirmed.

The Council inspected a specimen of the weather notice frames ordered at last meeting (Minutes, p. 81), and gave instructions that the title of the Office be affixed to the house, above the frames.

Submitted—An estimate (Lr. 340) from Messrs. Rayment (Minutes, p. 81) for alterations to basins and urinals amounting to 61*l.* 15*s.* 0*d.*, if the waste from the latter was carried into the soil pipe.

Mr. Scott stated that the sanitary inspector had expressed himself satisfied with Mr. Rayment's proposal, excepting as regards the soil pipe.

The estimate was accepted, with the addition that the waste should be carried down by a separate pipe, to be properly ventilated at the top and bottom.

Read—The following letter from Mr. Osler, which was ordered to be printed on the Minutes on Mr. Buchan's recommendation (Minutes, p. 76) :—

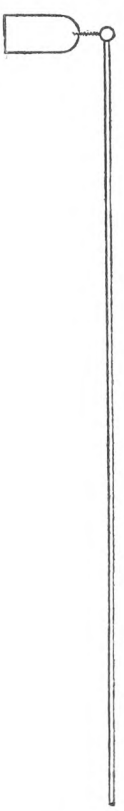
(M.O. 92.)

DEAR MR. SCOTT, South Bank, Egbaston, January 10, 1890.

I HAVE recently received the Quarterly Journal of the Meteorological Society containing the report of the valuable and interesting experiments made by Mr. Dines on the connection between pressure and velocity of the wind, and am glad to see the satisfactory results he has so far obtained.

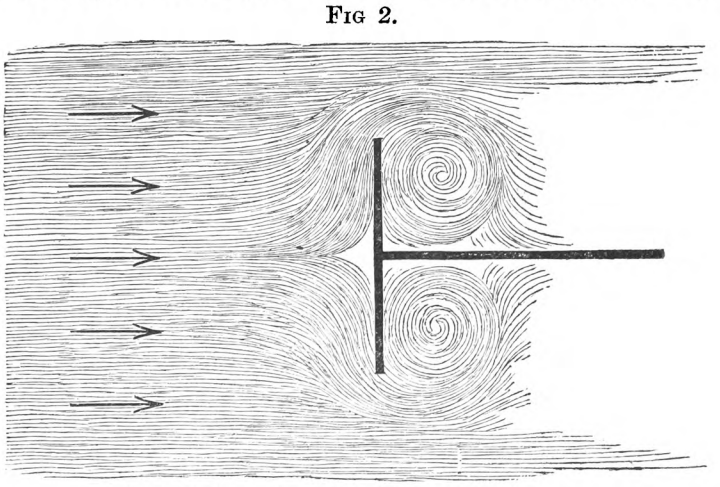
A few years ago I commenced some experiments on pressure plates by the reverse process, and for that purpose hired a large "blower," to be driven by steam power, my object in the first instance being to ascertain, if possible, in what way the air impinged upon and left the pressure plate. I obtained a strong current of air through a wooden tube, 9 inches square, attached to a large box into which the machine delivered the current; in order to obtain as steady an action as possible—and it occurred to me that this might throw a little light on some of the facts Mr. Dines had obtained—I made some little tiny vanes in thin cardboard which were attached by a short silk thread to a small wire stem long enough to reach through the current to be tested. (Fig. 1.)

FIG. 1.



I was prevented by ill health from carrying out these experiments to the desired extent as to velocity, but will state the kind of results obtained. The little vanes being so free to move in all directions, it was soon found that a constant eddy was formed at the back of the plate (36 square inches area) near the edge, it was steady and extended all round the plates, both square and round, but I cannot speak very accurately now, and there seemed to be a shallow cone of almost still air close to the plate in front. (Fig 2.) May not this, in some measure, account for the greater pressure on a narrow strip of the same area, there being no space for the eddy with its back action, nor for the slight cone in front, if there is one, to interfere with the air impinging at right angles to the plate? To further test the action at the back of the plate, a round plate (36 inches area) with a rim 1½ inch deep, had a thin sheet of india-rubber tied over it. An open tube was fixed

FIG 2.



in the rim communicating with the air beyond the current to enable the india-rubber to swell out if a slight vacuum occurred behind the plate, and an index tube to mark the distance if it moved, but for want of a stronger current than I could obtain it was not possible to get any satisfactory results. I can only say that if there is any vacuum it must be very slight, but with a more powerful blower it seems probable some valuable information regarding a back action may be obtained.

A few years prior to this trial of a "blower" I made a few experiments with the natural currents of the atmosphere by inserting small glass siphons (on Dr. Lind's principle of taking pressure) at the back of a wooden disc, the mouth of the siphon extending through the wood just level with the front of the plate,—one in the centre, one near the edge, and one between the two. Coloured water was used, but the irregularity of pressure in the open air frustrated all accuracy. I afterwards made a larger disc (2 feet area) and larger siphons, but failed for the same reason. It was a few years after this that I hoped to be more successful with a "blower."

Respecting the Report of the Birmingham Philosophical Institution for 1836, your letter to Mr. Woodward, telling him you had copied the text of the description of the record of the anemometer, led me to read it, which I think I could not have done before, or I should have noticed the error in the compass point in putting the two W's together instead of inserting the S between them; will you kindly correct the printer's error? The first paragraph is certainly not my writing, for I never write as if it was someone else's. The Secretary or Curator must have sent it to the printers, as that was out of my province entirely.

That compass error suggests to me that many years ago I adopted a simple shorthand in writing the points of the compass which I found very useful, and which I cannot help thinking might with some advantage be more extensively introduced. I will briefly show it; it can do no harm, if it does no good, to mention it.

| N, — S, / W, e E.

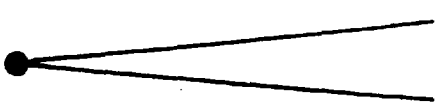
| N. Perpendicular stroke and first part of the letter N.
— S. Horizontal line and furthest removed from the perpendicular.
\ W. Intermediate, and *first* stroke in the letter W or the *last*.
or /. Stroke of the W might be adopted, if preferred, being rather easier to write.
e E. Small e being so easily written, and so entirely different from the other signs.

The writer has been accustomed to use the *first* stroke of the W, but *now* thinks the *last* best.

		e	e	e|e	e	e—e	—e	=e
N	NNE	NE	ENE	E	ESE	SE	SSE
—	=\	—\	\—\	\	|\	|	|\
S	SSW	SW	WSW	W	WNW	NW	NNW
	or =/	—/	/—/	/	/|/	|/	||/

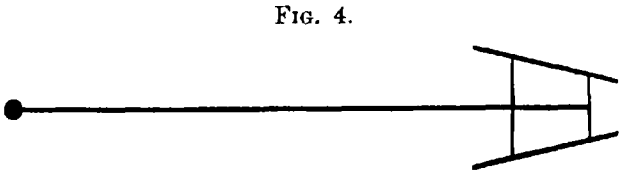
Respecting the diagrams, perhaps I may as well add that the instrument had been only at work a few weeks when the copies were taken. The vane was on the roof of our old Philosophical Institution, by no means a favourable situation; it was about 5 or 6 feet long, and about 7 inches deep. It consisted of two vanes put together in a wedge form thus (Fig. 3), so as always to feel the pressure of the wind, and not lie like a single vane in a neutral line where there is no pressure. It was full heavy, and therefore more liable to swing too far; this was afterwards corrected in later instruments, and made as light as possible.

Fig. 3.



I have also used vanes of this form (Fig. 4), which I think is rather steadier than the wedge shape; one of these is on the Wrottesley anemometer.

Fig. 4.



When I undertook, at the request of Lloyd's Committee at the Royal Exchange, a short time before the building was finished, to erect an anemometer in the Underwriters' Room, a rather difficult problem presented itself, for in addition to the working of the instrument itself, large dials showing the direction of the wind had to be fixed at the opposite end of the Underwriters' Room to the instrument, also in the lobby, and in the Captains' Room; it was a long way to carry the movement, requiring some power. This led me to employ fan sails, similar to those which automatically keep windmill sails to face the wind. It was the first occasion in which that principle was employed in connection with an anemometer, and in addition to its great power it had the advantage of eliminating the oscillations, and giving the mean of them in a single line, but I consider the oscillations are an important feature for showing the character of the current. There have been most made of late years with this sort of vane. I have on several occasions stated that there are two kinds of main currents,—a smooth one when the air is rushing to fill up a deficiency, and a rough one when an accumulation is being dispersed; but there are intermediate conditions of other currents, cyclonic, &c., that render an examination of the oscillations of value, but until we know more about them the mean line is of most value.

I am, &c.
(Signed) F. Osler.

Submitted—The following report on the 8.30 p.m. forecasts for January 1890:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	52	58	55	84
"	b	26	32	29	
"	c	13	3	8	
"	d	9	7	8	
Scotland, E.	a	32	48	40	74
"	b	36	32	34	
"	c	29	10	20	
"	d	3	10	6	
England, N.E.	a	26	39	33	75
"	b	42	42	42	
"	c	23	13	18	
"	d	9	6	7	
England, E.	a	29	39	34	66
"	b	32	32	32	
"	c	32	16	24	
"	d	7	13	10	
Midland Counties	a	29	23	26	65
" "	b	32	45	39	
" "	c	32	23	27	
" "	d	7	9	8	
England, S.	a	45	36	41	80
"	b	36	42	39	
"	c	19	16	17	
"	d	0	6	3	
Scotland, W.	a	48	49	49	83
"	b	26	42	34	
"	c	16	3	9	
"	d	10	6	8	
England, N.W.	a	55	45	50	78
"	b	23	32	28	
"	c	9	10	9	
"	d	13	13	13	
England, S.W.	a	55	55	55	83
"	b	26	29	28	
"	c	13	3	8	
"	d	6	13	9	
Ireland, N.	a	39	68	54	85
"	b	39	23	31	
"	c	16	3	9	
"	d	6	6	6	
Ireland, S.	a	39	68	54	86
"	b	39	26	32	
"	c	13	6	10	
"	d	9	0	4	
Summary.					
British Isles	a	41	48	45	78
"	b	32	34	33	
"	c	20	10	15	
"	d	7	8	7	

Submitted—The following summary, as a result of the storm warnings issued to the coasts of the British Islands since the last meeting of the Meteorological Council:—

1. WARNINGS ISSUED.

A + B (successful) - - - -	= 16
C (failures) - - - -	= 6

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

None.

I have carefully re-examined the chart for the morning of Sunday, February 16th, on which the bulk of the unsuccessful warnings (to our south-western and southern coasts) were issued. The depression was a very well-marked one, had advanced quickly to the south-west of Ireland, and was, in every way, of a threatening character. It apparently broke up into two parts later, one portion moving southwards towards Spain; gradients decreased, and the winds died down. With similar information, I should not hesitate again to warn the coasts threatened.

(Signed) FREDC. GASTER.

Telegraphic Branch,
19th February 1890.

Mr. Scott was instructed to inform Mr. Dines (Lr. 69) that some members of the Council hoped to visit his house to witness some of his important experiments.

Read—A letter from Mr. Baillie stating that eight logs had been received since last meeting, three of them being "excellent." Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Read—Letter 389 from Miss M. E. Anderson applying for re-appointment on the staff (Minutes, 1885, p. 76).

Mr. Scott stated that Mr. Baillie reported favourably of her work, and he was authorised to re-engage her at a salary of 1*l.* per week, being the amount she had been receiving when she left the Office.

Submitted—The following list of publications which had been received since the last meeting:—

Christie, W. H. M.—Areas of faculæ and sun-spots, compared with diurnal ranges of magnetic declination, horizontal force, and vertical force, as observed at the Royal Observatory, Greenwich, in the years 1873 to 1888.

—— Mean daily area of sun-spots for each degree of solar latitude for each year from 1874 to 1888, as measured on photographs at the Royal Observatory, Greenwich.

Riggenbach, A.—Die unperiodischen Witterungserscheinungen auf Grund III. jähriger Aufzeichnungen der Niederschlagstage.

Singer, K.—Die Bodentemperaturen an der K. Sternwarte bei München und der Zusammenhang ihrer Schwankungen mit den Witterungsverhältnissen.

Brussels, Observatoire Royal.—Annuaire. 1890.

Washington, Hydrographic Office.—Report of ice and ice movements in Bering Sea and the Arctic Basin, by Ensign E. Simpson.

Busin, P.—Quelques considérations générales sur les cartes du temps et spécialement sur les types isobariques en Italie.

—— Sulle predizioni del tempo.

—— Le temperature nell' Emilia, nella Lombardia e nel Veneto.

Berg, E.—Die Gewitter Russlands im Jahre 1886.

San José de Costa Rica, Instituto Meteorologico Nacional.—Boletin trimestral. 1889.

63, *Victoria Street, March* 5, 1890.

PRESENT:

MR. F. GALTON IN THE CHAIR.

PROFESSOR DARWIN. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 19) were read and confirmed.

Mr. Scott reported, as regards the testing of Violle's actinometer for the Solar Physics Committee (Minutes, p. 26), that two of the instruments had been sent to the Office, and that these had been forwarded on August 8th to Kew to be tested. (P.C. 1527.)

Mr. Whipple had sent to the Office, on December 21st, (M.O. 2263) two copies of results of observations made with the instruments. One of these had been forwarded to Mr. Blanford by General Strachey's directions.

Mr. Blanford had since written (M.O. 441) suggesting certain alterations in the mode of testing the apparatus.

Mr. Scott was instructed to request Mr. Blanford to draw up complete instructions for the required experiments with the Violle's actinometer, and to forward them to the Council. (P.C. 501.)

Mr. Scott reported that the barograms for the 12 years 1871–82 had been passed through the harmonic analyser, and that he had asked Professor Darwin for instructions as to the best mode of publishing them, and that Mr. Darwin had attended at the Office by request, February 20th, to consider the question.

Mr. Darwin submitted the following memorandum, which was ordered to be printed, Mr. Darwin's attendance at the Office to be counted as attendance at a meeting:—

MEMORANDUM on the HARMONIC ANALYSER and its RESULTS.

The consideration of the proper treatment and mode of publication of the harmonic constants, as derived mechanically from barograms and thermograms, naturally suggests the expediency of reviewing our policy and intentions with regard to the use of the harmonic analyser, and I shall therefore consider the larger question as well as the smaller in this memorandum.

The instrument was introduced with the intention of superseding arithmetical processes, so as to afford an increased output of results with a given amount of work. When the machine was first put in use it was thought expedient to continue the arithmetical treatment of barograms and thermograms simultaneously with the new mechanical method. But I do not quite understand the policy which has governed the present state of work in the Office, for it appears to me that this double treatment of the curves has been continued much longer than was necessary, and that the analyser has increased the work, without a corresponding increase in results.

When for any month 24 hourly means of temperature and pressure have been measured and computed, the arithmetic necessary to harmonically analyse the curve represented by those 24 ordinates is quite insignificant compared with the previous work. Moreover, the 4th and 5th constituents (not given by our machine) are derived from this analysis, and besides, the work can be verified. The arithmetical process being then better than the mechanical, this instrument can only be used with advantage if it permits us to drop the laborious measurement, tabulation, and subsequent arithmetic. It is true that it has been usual to note the march of the constants for each five days on the machine, but I doubt whether much more can be derived from the harmonic analysis for annual inequalities of the 73 five-day values than we should get from a similar analysis of 12 monthly means.

The state of the work on the barograms and thermograms received from the seven observatories appears to be as follows:—

BAROGRAMS.

Arithmetical Treatment:—

Hourly measurements of the curves have been made from 1868 up to date.
1869–73. No hourly means worked.
1874–78. Hourly means worked, but not checked.
1879–83. Hourly means worked and checked.

Mechanical Treatment:—

1871–82. The curves have been passed through the machine, and the coefficients worked from the cylinder-readings, but remain unchecked.

THERMOGRAMS.

Arithmetical Treatment:—

Hourly measurements of the curves have been made from 1868 up to date.
1869–78. No *hourly* means worked.
1879–83. Hourly means worked and checked.

Mechanical Treatment:—

1871–82. The curves have been through the machine and the results checked in the manner referred to below; and the harmonic constants for each month and year have been published.

No numerical harmonic analysis of hourly means has been made.

It seems, from the above statement, that the heaviest part of the work which would lead up to numerical harmonic analysis has been done for most of the years 1871–82, and that mechanical harmonic analysis has also been done, except verification. I think then that much work has been done in duplicate, and that we ought to reconsider our policy carefully with a view of minimising this duplication.

The points we have to consider seem to be as follows:—

1. The requirements of meteorologists, and the mode of publication of our results.
2. The utility of the machine for curves which have not yet been treated in any way.
3. The mode of completion of work already partly done, both arithmetically and mechanically.
4. The method of testing the results derived from the machine.

These points are not quite independent, and so I shall not keep what I have to say strictly under these four heads.

The present policy was initiated before I was a member of the Council, and I do not exactly understand the considerations which dictated it.

It was thought, I believe, that meteorologists would appreciate the harmonic mode of stating the fluctuations in temperature and pressure, but it does not appear to have met with a warm welcome. Meteorologists, I understand, still demand hourly values, or, what amounts to the same thing, curves recompounded from harmonic constants.

If the harmonic notation is the best—and it is certainly excellent—we ought not to give up our undertaking because meteorologists have not yet accustomed themselves to it. But we *must* meet the demands of meteorologists, and, if they require it, we must recompound our harmonic constants in the form of a mean curve, or of hourly values.

Such a conclusion would tell heavily against the use of the analyser, for whilst the arithmetical process leads to hourly values on the road to the harmonic constants, the mechanical process has to be completed by the tracing and measuring of curves. Even with General Strachey's machine the making of such curves would be a heavy piece of work.

The next question is whether or not hourly values derived from harmonic constituents up to the third only would be sufficiently accurate. The judgment of the Council, and particularly of Mr. Buchan, on this point must be given. I should think that such values might be found sufficient, but it would be necessary that a certain amount of comparison should be made to test the degree of concordance between the arithmetical and mechanical work.

If it is decided that we must have arithmetically computed hourly means, then I submit that it would be a waste of labour to use the machine on any new work.

It does not seem useful to consider the mode of publication of results until we know exactly what we are aiming at.

Similarly, when a definite policy as to new work is decided on, we shall be in a position to settle how the work in hand is to be completed. I imagine that it will be well to consider the state of the work at each observatory and for each year, and, when the arithmetical work is far forward, we ought to push it on to a conclusion, and drop the analyser results, and vice versâ.

The last of the points enumerated is the one on which I was specially asked to advise, viz., how we are to treat the mechanically-derived barogram harmonic constants

There is every reason to believe that the machine has been worked with every reasonable care and accuracy, and yet we may feel quite sure that errors have crept in. To run the curves through the machine again would be a work of such magnitude as to be quite out of the question, and we must look to rougher methods of verification.

The plan adopted in the case of the published thermogram constants was to watch the march of the readings of the cylinders from five days to five days, and to examine any suspicious cases. Errors were detected in this way, and the check is valuable, but I cannot think it a sufficient one.

We ought, I think, to compute the mean from the harmonic constants for a certain hour for, say, every month, and compare the result with the mean for the same hour as computed from measurement on the curve and addition. The hour, or hours, chosen for the comparison should be such as to involve all the harmonic constants; 1 a.m. or 1 p.m. would satisfy this condition. There will of course be a systematic discrepancy between the two, on account of the absence of the fourth and fifth harmonics in one of the two means, but errors would probably be detected by an apparent absence of system

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in the discrepancies. Where such errors are suspected the curves would have to be examined more closely, say for every five days, or perhaps run through the machine again.

I do not think we ought to publish our barogram constants without such verification as this.

I have felt some difficulty in writing this memorandum from not knowing (what perhaps I should know) exactly what scheme it was intended to follow when the analyser was purchased.

(Signed) G. H. DARWIN.

February 25th, 1890.

Reported—That the plumbers' work in the Office was in progress.

The Council approved provisionally of a frame and a board for the exhibition of publications and notices at the entrance of the Office.

Read—A letter from Mr. Baillie stating that since last meeting three logs had been received, one of them being "excellent."

Mr. Scott was instructed to convey the thanks of the Council to the observer.

Submitted—The following memorandum :—

HAY HARVEST FORECASTS, 1889.

Meteorological Office, Telegraphic Branch,
March 6, 1890.

SIR,

I BEG to submit, herewith, the results of the checking of the Hay Harvest Forecasts issued during the hay-making period of 1889.

The telegrams were transmitted daily between 3.30 p.m. and 4 p.m. on each week-day for about five weeks, beginning on the 10th of June in the Eastern and Southern districts of England, and ending on the 3rd of August over the greater part of Scotland, and a week later in Ireland.

Notwithstanding the very unsettled weather which prevailed during the latter half of the period, the general percentage of successful forecasts (89) was the highest ever reached.

The largest general percentage (95) was reached in the Midland Counties, while the smallest (82) was in Scotland, E. and Scotland, W.

In addition to the above, telegrams were sent to several other gentlemen, at their own cost.

In Table II. will be found remarks added by several of the recipients, speaking in high terms of the forecasts.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Council.

(Signed) FREDC. GASTER.

TABLE I.—SUMMARY of RESULTS.

Districts.	Names of Stations.	Percentages.				Total Percentage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N. - -	Munlochy and Golspie - -	57	33	10	—	90
SCOTLAND, E. - -	Aberfeldy, Rothiemay, and Glamis	51	31	13	5	82
ENGLAND, N.E. -	Chatton and Ulceby - -	67	26	7	—	93
ENGLAND, E. - -	Rothamsted, Thorpe, and Thetford.	64	29	7	—	93
MIDLAND COUNTIES -	Cirencester and East Retford -	61	34	3	2	95
ENGLAND, S. - -	Downton, Horsham, Maidstone, and Reading.	60	30	10	—	90
SCOTLAND, W. -	Stranraer, Islay, and Dumbarton	52	30	14	4	82
ENGLAND, N.W. -	Leyburn and Prescot - -	53	30	12	5	83
ENGLAND, S.W. -	Spring Park (Gloucestershire), Clifton, Bridgend (Glamorganshire), and Glastonbury.	50	40	9	1	90
IRELAND, N. - -	Moynalty - - -	50	40	7	3	90
IRELAND, S. - -	Moneygall, Kilkenny, and Ardfert Abbey.	56	29	10	5	85
	Mean for all districts - -	57	32	9	2	89

HAY HARVEST FORECASTS, 1889.

TABLE II.—RETURN showing the NUMBER of FORECASTS sent to each of the under-mentioned PERSONS, with the SUCCESS or otherwise of the FORECASTS.

Districts.	To whom sent.	Address.	No. of Forecasts sent.	No. of Forecasts checked.	Percentages.				Remarks.
					Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
0. SCOTLAND, N.	Rev. Dr. Joass	Munlochy, Inverness	30	30	56·7	40·0	3·3	—	
	Major Smith	Golspie	30	30	56·7	26·6	16·7	—	Major Smith remarks that "the fore-casts have been upon the whole very reliable."
1. SCOTLAND, E.	C. W. L. Forbes	Aberfeldy	30	30	56·7	23·3	13·3	6·7	
	G. Murdoch	Rothiemay, Huntley	26	24	41·7	45·8	12·5	—	
	J. Whitton	Glamis Castle, Glamis	25	24	54·2	25·0	12·5	8·3	
2. ENGLAND, N.E.	Sir Jacob Wilson	Chillingham Barns, Chatton, Northumberland.	30	30	66·7	26·6	6·7	—	
	J. Turner	The Grange, Ulceby	30	30	66·7	26·6	6·7	—	
3. ENGLAND, E.	Sir J. B. Lawes, Bart.	Rothamsted, Harpenden	30	30	53·3	36·7	10·0	—	
	W. Birkbeck	High House, Thorpe, Norwich	30	30	73·3	20·0	6·7	—	Mr. Birkbeck says "the forecasts have been very successful."
	J. Fergusson	Brettenham Manor, Thetford	33	24	66·6	29·2	4·2	—	Mr. Fergusson also remarks that "the forecasts have been remarkably correct during the last month, and a good guide to the haymaker."
4. MIDLAND COUNTIES	Professor Ohm	Royal Agricultural College, Cirencester.	29	29	65·5	31·0	—	3·5	
	E. E. Harcourt-Vernon	Grove Hall, East Retford	30	30	56·7	36·6	6·7	—	
5. ENGLAND, S.	E. P. Squarey	The Moot, Downton, Wilts	30	30	70·0	30·0	—	—	Mr. Squarey says "the forecasts have generally been satisfactory."
	G. M. Allender	Stammerham, Horsham	34	34	52·9	29·4	17·7	—	
	C. Whitehead	Barming House, Maidstone	30	30	53·3	36·7	10 0	—	
	Martin J. Sutton	Reading	36	36	61·1	25·0	13·9	—	Mr. Sutton remarks that the forecasts are read with interest by great numbers of people."
6. SCOTLAND, W.	M. J. Stewart	Ardwell, Stranraer	30	30	60·0	26·7	6·7	6·6	
	J. S. R. Ballingal	Eallabus House, Islay	30	30	50·0	26·7	16·7	6·6	
	W. Calder	Castle Hill, Dalreoch, Dumbarton	30	30	46·6	30·7	16·7	—	
7. ENGLAND, N.W.	G. W. Wray	Leyburn, Yorkshire	24	16	43·8	31·2	18·7	6·3	
	The Earl of Derby, K.G.	Knowsley Hall, Prescot	24	24	62·5	29·1	4·2	4·2	
	The Earl of Ducie	Spring Park, Gloucestershire	30	30	50·0	43·3	6·7	—	
8. ENGLAND, S.W.	T. Dyke	Long Ashton, Clifton, Bristol	33	30	66·7	23·3	10·0	—	
	Col. T. B. Turbervill	Ewenny Priory, Bridgend, Glamorganshire.	30	30	36·7	50·0	13·3	—	
	R. Neville Grenville	Butleigh Court, Glastonbury	30	30	46·7	43·3	6·7	3·3	
9. IRELAND, N.	E. F. Farrell	Moynalty, Co. Meath	30	30	50·0	40·0	6·7	3·3	
10. IRELAND, S.	D. A. M'Cready	Larchvale, Moneygall, King's Co.	42	42	50·0	38·1	7·1	4·8	
	D. A. Milward	Lavistown, Kilkenny	36	36	63·9	30·5	5·6	—	
	W. Talbot Crosbie	Ardfert Abbey, Tralee, Co. Kerry	30	30	53·3	20·0	16·7	10·0	

Submitted—The following statements of work during February 1890:—

MARINE BRANCH.

March 4th, 1890.

Examined 10 new logs, and 2 lighthouse registers.

Obtaining mean results of wind and instrumental data in the Red Sea district. The charting of winds and currents has now been completed for all months, and experiments of a tentative nature made with the object of representing the general current directions.

Having exhausted the Office logs up to date for currents in all oceans, arrangements have been made with the Hydrographic Department for the loan of all the Remark books kept on board Her Majesty's ships as far back as 1862. The currents in more than a hundred of these volumes have already been dealt with.

Representing the cyclone tracks for the South Indian Ocean between 1848 and 1885 on annual charts.

Before the close of the month the discussion of the data for the district between the Cape of Good Hope and New Zealand had been fairly started, nearly the whole of the staff being occupied on it.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.
(To 28th February 1890.)

Monthly Weather Report, 1887.—The preparation of number for May half done.

Weekly Weather Report, 1888.—Monthly summary for April is in type; preparation of that for May half done.

Weekly Weather Report, 1889.—Monthly summaries, August to December, in printer's hands; those for August and September have been revised and sent "for press."

Appendices I. to IV. completed and published.

Weekly Weather Report, 1890.—All the numbers issued to date.

Monthly Summary for January in hand; about half done.

Appendices I. to IV. are in hand, and well forward.

Monthly Means for Daily and Weekly Weather Report Stations are being prepared, as follows:—

Temperature for 20 years, 1871–90.

Rainfall for 25 years, 1866–90.

Pressure at 8 a.m. (Daily Weather Report Stations only), 20 years, 1871–90.

Preparation has also been made for drawing the curves, so that these values may be used in preparing the Daily and Weekly Reports from 1st January 1891.

Daily Weather Report, 1890.—All numbers issued to date.

Correction and addition sheet for January issued.

The title-page and frontispiece for the second half of 1889 are in printers' hands.

Primary Checking of Storm Warnings, 1890.—Done to date and reports handed in.

Checking of Daily (8.30 *p.m. Forecasts*, 1890).—Done almost to date, and summaries up to end of January handed in.

During this month Mr. Brodie has attended at the Office daily for several hours, and devoted almost the whole of his time to the preparation of the Monthly Summaries for August to December 1889, which have consequently been all written up; Mr. Scott has written that for April and part of that for May, 1888. Mr. Brodie has now in hand the summary for January 1890 and the Monthly Weather Report for May 1887. Mr. Gaster attended at Court of Queen's Bench for three days, viz., February 20th, 21st, and 24th.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

February 28th, 1890.

Observatory Returns.—The calculation of the hourly means, for five-day periods, for the second half of 1887, has been begun.

Quarterly Weather Report.—The letterpress for Part II., 1880, is nearly completed.

Miscellaneous.—The Bunhill Row sunshine cards, for fourth quarter of 1889, tabulated for Royal Meteorological Society. The checking of the harmonic analyser results has been under consideration during the month; and a good deal of time has also been occupied in connexion with the hourly means of pressure and temperature, now being worked.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

March 1st, 1890.

Examinations.

September and *October* 1889.—Completed.
November 1889.—*Thermograms* and *barograms.*
Weekly examination of curves and documents (on receipt) from all observatories.

Reports, &c.

July to *September* 1889.—"Notes of Errors" to all observatories, and monthly report thereon.
Investigations *re* Falmouth and Kew barograph residuals.

(Signed) T. E. ALLEN.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands, since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful) - - - - -	= 4
C (failures) - - - - -	= 2

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
5th March 1890.

Submitted—The following list of publications which had been received since the last meeting:—

Hayden, E.—The modern law of storms.
—— Hurricanes in the Bay of North America.
Paris, Bureau Central Météorologique.—Annales. 1885, Tome ii. (2e Partie), 1886, Tome ii., 1887, Tomes i., ii., et iii.
Sydney, Royal Society.—Catalogue of the scientific books in the library of the Royal Society of N.S.W. Part i.
Marseilles, Commission de Météorologie du Département des Bouches-du-Rhone.—Bulletin Annuel. 1888.
Fines, Dr.—Bulletin météorologique annuel du Département des Pyrénées-Orientales. 1888.
—— L'observatoire de Perpignan en 1887.
—— Revue climatologique, météorologique, agricole et sanitaire de l'année 1888 à Perpignan.
Sorel, G.—La pression du vent d'après les anémomètres de Robinson et de Bourdon.
—— Sur le calcul de la pression du vent.
Koudritzki, —.—Les observations météorologiques de la station météorologique de Korostyscheff. 1888.
Tiflis, Physikalisches Observatorium.—Meteorologische Beobachtungen. 1887–1888.
Berlin, Deutsche meteorologische Gesellschaft.—Berliner Zweigverein der deutschen meteorologischen Gesellschaft. 1890.
Raulin, V.—Distribution des pluies à la surface des Pyrénées en 1871–80.
Ellis, W.—Map showing line of equal magnetic declination for the year 1890.
Hartnup, J.—Report of the Astronomer to the Marine Committee, and results of meteorological observations made at the Liverpool Observatory, Bidston, Birkenhead, during the years 1884 to 1888.
Prince, C. L.—The summary of a meteorological journal kept at the observatory, Crowborough, Sussex. 1889.
St. Petersburg, Physikalisches Central Observatorium.—Jahresbericht für 1887 und 1888.
—— —— Annalen. 1888. Theil I.
St. Petersburg, K. Akademie der Wissenschaften.—Repertorium für Meteorologie. Bd. xii.

63, *Victoria Street, March* 19, 1890.

PRESENT:

MR. F. GALTON IN THE CHAIR.

MR. BUCHAN.	MR. STONE.
PROFESSOR DARWIN.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 5) were read and confirmed.

The Memorandum by Professor Darwin "on the Harmonic Analyser and its results" (Minutes p. 90) was considered, and Mr. Scott was instructed to have a set of the Valencia barograms and dry-bulb thermograms for one year passed a second time through the analyser, to test the accuracy of the previous work.

Mr. Scott reported that the electric anemometer was now in operation at Kew (Minutes, p. 34). He was instructed to have the results compared with those of the ordinary anemometer.

Read—A Memorandum from Mr. Baillie, stating that since last meeting seven logs had been received, five of them being "excellent." Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful) - - - -	=37
C (unsuccessful) - - - -	= 9

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
March 19, 1890.

It was resolved that the period of absence of the Chairman from England should be counted as two months, and that the proportion of his salary for that time should be paid to the Vice-Chairman Mr. Galton, in lieu of all remuneration as an ordinary member of Council since January 7th.

The following scale of payment was agreed to:—

——	Travelling Allowances.	Salaries and Attendance Fees.	Total Payments.
	£ s. d.	£ s. d.	£ s. d.
General Strachey* - - - - -	- - -	243 5 0	243 5 0
Mr. Galton† - - - - -	- - -	137 18 3	137 18 3
„ Buchan - - - - -	75 0 0	129 5 11	204 5 11
„ Darwin - - - -	16 5 0	108 19 9	125 4 9
„ Stone - - - - -	22 10 0	121 3 5	143 13 5
Captain Wharton‡ (Hydrographer) - -	- - -	76 9 8	76 9 8
	113 15 0	817 2 0	930 17 0

SUMMARY.

Council.	Petty Expenses.	Income Tax.	Unexpended.	Total.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
930 17 0	4 0 3	21 1 1	44 1 8	1,000 0 0

* Chairman's salary during ten months.
† Salary as Vice-Chairman during two months, in lieu of other remuneration during absence of Chairman.
‡ Fees for attendance only.

Submitted—The following list of publications which had been received since the last meeting:—

Augustin, F.—Untersuchungen über die Temperatur von Prag.
Canino, V.—Il clima di Napoli.
Dove, K.—Kulturzonen von Nord-Abessinien.
Gasparis, A. de.—Discussione e confronto con gli anni precedenti dei valori meteorici ottenuti durante l'anno 1888 nella Specola di Capodimonte.
Hann, J.—Die meteorologischen Ergebnisse der Lady Franklin Bay-Expedition 1881–83.
Hjeltstrom. S.A.—Sur la conductibilité de la neige.
Monaco, Prince Albert de,—Recherches des animaux marins.
Naples, R. Osservatorio Astronomico.—Bullettino meteorologico. 1888.
Toronto, Meteorological Service.—Report. 1886.

LONDON: Printed by EYRE and SPOTTISWOODE.
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.
[221.—25.—4/90.]